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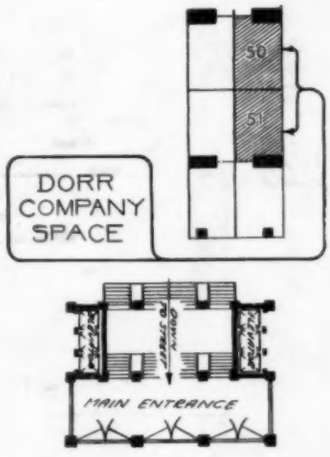

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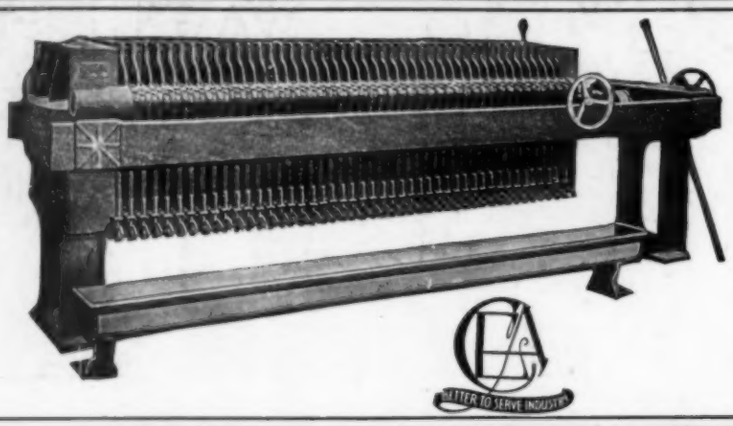

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Japan and The Chemical Industry

AS THE news from Japan assumes more reliable and less hysterical character, it is still evident that the appalling loss of life and property first reported is not to be greatly minimized. The catastrophe will undoubtedly take rank as the greatest in recorded history.

That the United States should throw itself promptly and vigorously into the work of relief might have been taken for granted on purely humanitarian grounds. But there is a closer bond of sympathy and understanding between the island nation of the Orient and our own people, arising from the striking technical development of Japan within the last few decades. No foreign nation has been more assiduous than Japan in adapting our own rapid industrial development to its needs, nor has any foreign people taken so great advantage of the opportunity to educate its best representatives in American technical schools. It is doubtful therefore if any group of people in the two nations have a stronger bond of sympathy and understanding than exists between the engineers and scientists. This is a particularly potent reason for urging the chemical engineering industries to participate actively and promptly in the work of relief. Opportunity for more substantial aid will doubtless be offered for many months to come. Speaking for the chemical engineering industries, we express the deepest sympathy with the people of Japan and assure them of our desire to aid in every way their early recovery.

Weathering Storm By Means of Active Research

WHY do clear-thinking, well-informed business men who hold the stock or compose the directorates of companies in our chemical engineering industries so frequently disparage a policy of research? An old riddle which is growing more perplexing as it ages! To regard a technical staff as a semi-liability at best, to dispense with it whenever storm clouds gather on the business horizon—such is altogether too frequently the creed of those who pass upon expenditures. No more clear-cut evidence of such folly, or rather the wisdom of the maintenance of research, has come to our attention recently than the remarkable story of achievement made by one of the great yeast companies. This story is at once an inspiration to the research worker and a rebuke to those whose first thought is to reduce the technical staff in time of financial difficulty.

A few years ago yeast was made by this particular company from a cereal mash on an enormous scale and in eleven plants. About one-quarter of the grain was converted to yeast; from the mash alcoholic beverages and allied products were produced which yielded sufficient revenue to make possible a very low margin of profit on the yeast. Then came our entrance into the war. Edible cereals could no longer be used. Research found a manner of using oats as a substitute. Labor cost rose as high as 260 per cent above the pre-war level. As an offset to this, research developed a process to increase the yield to a figure previously unheard of.

Then prohibition came, seemingly to cap the climax. Competition with industrial alcohol makers could not be met with the costly high-grade grain alcohol produced by this process. Yet without this market the cost of yeast must be substantially increased. Again after a real struggle on the part of the research staff in a comparatively unknown and poorly charted field of chemistry the answer was found—production from new materials with the evolution of no alcohol and of almost no other side products. The net result of its research, which was well paid for, enabled this company to maintain its retail prices at pre-war standards through years of rapidly shifting economic conditions. Its process reached an efficiency of practically 100 per cent conversion of raw materials to yeast. Its product was improved, its sales were increased, its research facilities developed to the highest point. And all this through a period when many firms were endeavoring to weather the storm by putting a sign over the laboratory door, "This Way Out."

We have cited other similar instances; we shall cite more. Research, despite the many kicks it has had, is alive and growing. Here is added justification for our contention that it is indispensable in trying as well as in prosperous periods. Properly directed, there is no better manner of insuring increased dividends.

Helium and Commercial Aviation

CHEMICAL and metallurgical engineers may share in no small degree the triumph of the navy in the recent flight of the American-built dirigible ZR-1. To the former is due credit for the production of non-flammable helium as the lifting medium, and to the latter for the production of Duralumin and other metals and alloys that entered into construction of the immense framework of the airship. Given these materials of peculiarly appropriate properties, the engineers charged with design and construction were able to produce a ship that made the most creditable performance of any of the navy's lighter-than-air craft. It will be recalled that the R-38, built in England for the United States, collapsed and burned on a test flight at Hull, while the Roma, built in Italy and sold to the United States, fell

and exploded on a trial flight at Hampton Roads. In both cases there was heavy loss of life, due largely to the use of hydrogen instead of helium.

The significance of the spectacular flight of the ZR-1 over New York City and Philadelphia last week will not be lost on those who are interested in commercial aviation, even though the ship that made the demonstration is in the service of the navy. It has long been believed that dirigibles filled with helium offer the best medium for passenger transportation by air, and it has needed only a satisfactory demonstration that ships could be built and navigated under varied weather conditions to induce capital to venture into this new field. The navy is thus a pioneer in a branch of aviation that is likely to develop more actively in the peaceful pursuits of commerce than in the arts of war. Not the least factor that favors this probability is the fact that the United States has a comparatively abundant supply of helium in her natural gases. Indeed in this respect she is most favored among the nations of the world; and while the production and supply of the gas undoubtedly will remain in the control of the government, it can be loaned to companies engaged in commercial aviation—put into active storage, so to speak—until such time as emergency demands its return.

It is expected that ZR-1 will shortly be joined by ZR-3, which is now being built in Germany for the United States. With two such craft our country will take the lead in aviation with dirigibles, and will have an exceptional opportunity to study and develop air transportation on a commercial scale.

The Chemical Engineering Industries And Hydro-electric Development

THE possibilities for extension of chemical and electrochemical activity that might lie in the extended building of new water-power stations have been uppermost in many minds of late. Large undertakings in the development of power sites are under way in many parts of the continent and larger construction is forecast. Such developments have in the past meant a supply of comparatively cheap power that has attracted to their vicinity many large and successful plants. These new enterprises are naturally viewed with a thoughtful and speculative eye by those in search of similar opportunities.

However, before any steps are taken leading to the construction of plants at new power centers, it is well to consider both present conditions and future probabilities. The superpower survey in the United States and similar studies recently made in Canada provide a reliable estimate of the total amount of such power available in both countries. Regarding these figures in the light of the increase in public utility demand, experts forecast that in another 25 years the major portion of the possible development of hydro-electric power will be used in supplying the demands of lighting, heating, traction and domestic power users and only a comparatively small excess can be devoted to the demands of industry. This is partly because the cheapest forms of power will naturally be retained by the public for use in the necessities of their daily life and partly because the location of such power sites makes it cheaper to transport power to centers of public demand than it is to transport raw materials to the manufacturing plant located at the dam and then transport finished goods to the market.

Of course there will occur many isolated cases in the future of water-power development when some special factor such as the presence of the principal raw materials in the immediate vicinity or the close proximity of a market will make it profitable to duplicate the industrial districts which have grown up at Niagara and Shawinigan Falls. The point to bear in mind is: Will the future demand of public utilities, in the case of any given water-power station, leave available for any considerable period of years a large supply of cheap power? This it must do to offset the transportation costs encountered by an industry choosing such a location. If this is improbable, it would be wiser to seek a location where expenses for freight are less and the market is more accessible, and where dependence for power must be placed on coal-burning generating stations.

The Gospel of "It Can Be Done"

AN OPTIMIST may be described as a person who hopes one day to eat a baked apple with no remnant of core therein. In time, however, he usually becomes a pessimist, basing his attitude on incontrovertible fact—he has never found a baked apple without a piece of core. After such an experience he slides easily into the it-can't-be-done class.

Whenever the subject under discussion veers toward the difficult of achievement, crape hangers appear in plenty. It hasn't been done, they recollect; and so they feel safe in proclaiming from the housetops that it can't be done. Their conclusions may be the result of logical reasoning and sincere conviction, but nevertheless they are stumbling blocks to progress, for they add the fear of failure to legitimate research; they distract the attention of the scientist from the pursuit of the inevitable, be the result success or failure. And the world is thus the poorer for want of definite knowledge.

Let us look backward as well as forward, and realize that nearly all the great scientific and industrial achievements have come about in the face of persistent derision from adherents to the it-can't-be-done gospel. Let us recall, for instance, that little more than a decade ago the greatest copper mine in the world was a mountain of discolored stone, assessed as valueless by those whose vision was limited to small-scale operations, who lacked imagination as to the inevitable march of progress in chemistry and electrometallurgy.

Marking time is wearisome and disheartening. "Do something, even if you do it wrong," is the advice proffered by a captain of industry who appreciates the value of action. We need a healthy optimistic outlook on many of the important questions of the day, but "hope deferred maketh the heart sick." What of our synthetic nitrate industry, what of the manufacture of synthetic rubber, and what of the production of domestic potash from kelp—to mention but three avenues for research and achievement? It may be true that synthetic nitrate plants are expensive to install and to operate, that insurance cost is heavy, that the product is not ideal for all purposes; it may be true that it appears

as sensible to try to manufacture synthetic carrots as synthetic rubber; it is true that potash occurs only in small amount in seaweed and that mechanical difficulties must be overcome before operations on a commercial scale are practicable. But these objections should act as incentives to further research, rather than providing ammunition for the pessimists.

We have no wish to minimize the value of caution; our remarks are directed more particularly in the direction of the unscientific thinker—against the non-technical executive who kills initiative by a continuous use of the wet blanket; against the "man in the street" who believes everything he reads and hears. Next time the it-can't-be-done croaker appears, show him a radio installation, an adding machine, an X-ray plant, vulcanized rubber and manganese steel, as well as some of the less advertised and less spectacular but nevertheless revolutionary achievements of the chemical engineer, and remind him of the progress made during the past 50 years, in spite of the pessimistic prophecies of armies of doubting Thomases.

Score One For Mr. Gompers

IN TIMES past it has so frequently been necessary for us to disagree with Mr. Gompers in his pronouncements on labor that it is a pleasure to find him voicing a sentiment we can heartily indorse. In the September issue of the *American Federationist*, official organ of the American Federation of Labor, Mr. Gompers pays tribute to the rôle of machinery in improving the lot of the worker, and shows the futility of opposing its introduction wherever it can supersede hand labor. He advises his co-workers to accept modern machinery as an ally and to concentrate their energies on the organization of their fellow workmen rather than against the spread of mechanical devices.

By way of forcing home the truth of his dictum, in case it should fall on unwilling or unbelieving ears, Mr. Gompers reviews a bit of personal history and makes an honest confession. In his earlier life he spent 26 years at the cigarmaker's bench. He was a hand workman and proud of his craft. Came a time when progress in the cigar industry introduced molds, much to the disgust of the unionized workers, who resented this attempt to substitute machines for human hands. Strikes followed as a practical protest against the innovation, and Mr. Gompers was one who struck. But sober reflection evidently followed that rash act, particularly when the strike was lost and the molds were introduced. And that brings us to the confession: "I am free to say that from that time there came some light to my mind, and I realized then for the first time that it was absolutely futile for workmen to protest against or go on strike against the introduction of a new machine, a new device or a new tool."

We wish the doctrine might be extended in the ranks of labor to certain other fruitful causes of disagreement: unreasonable wage demands, arbitration, collective bargaining, restricted production, the open shop and others. Doubtless after every strike there is a searching of minds by the strikers and a vague wondering whether it is all for the best; but too infrequently, it seems to us, do the leaders experience Mr. Gompers' sudden enlightenment and realize that they are kicking against the pricks and that their stand is futile. Rather is there a tendency to stand by the guns of tradition, to voice catch words and phrases, to drag a strike through its wearisome length to the discomfort and disgust of the public, only at last to bow to the inevitable. We commend the incident of the cigar molds, and particularly the enlightenment that followed their introduction, to all the lieutenants of Mr. Gompers who lead the ranks of labor. The lesson involved is applicable to many of labor's troubles today, and it were a shame to postpone its application until, like the case under discussion, it is related as an interesting bit of history.

Qualifications for A Career in Research

ACCORDING to Albert L. Barrows, who writes in a recent issue of the *Scientific Monthly*, "A research career calls to men who crave to know the unknown. It demands a spirit of adventure, a willingness to pioneer upon the frontier of present knowledge, an imagination to be able to guess, and guess correctly, the meaning of what is learned, and an ability to lead in thought ahead of that which is already understood, to wrest from the beyond new facts and new ideas, to deal with uncertainties, probabilities and sources of error, until one can find a treasure of fact which will make the uncertain sure and the incomplete more nearly complete."

The definition may seem idealistic, but it is one to which every serious-minded person must subscribe. Science and industry and civilization demand the persistent application of research, for the elucidation of those problems that hinder progress and prevent the full utilization of natural resources and the full measure of human happiness and comfort. This work must be done by devotees to the scientific spirit of precision and disinterestedness as to result, otherwise failure or, what is worse, duplicated effort and the dissemination of the inaccurate will result.

We are inclined to believe that if applicants for research positions were selected from those who "crave to know the unknown," who possess "a spirit of adventure in things intellectual," who exhibit "a willingness to pioneer upon the frontiers of present knowledge" and who are endowed with that rare faculty, "an imagination to be able to guess, and guess correctly, the meaning of what is learned and an ability to lead in thought beyond that which is already understood"—if these qualifications were demanded, it would mean the exclusion of many hit-or-miss experimenters from the ranks of researchers in university, industrial and government laboratories. The trouble is that the type of man needed for research is not always attracted by the salaries paid. This is particularly true in government and university laboratories, resulting in the employment of mediocrity, with a consequent high labor turnover, or altruistic sacrifice to a sense of duty and loyalty among those that are competent. Better standards of selection for research workers will do much to eliminate waste in initiating research and bringing it to fruition, and it would seem as though in Mr. Barrows' statement of qualifications we have a starting point for the development of such standards.

The Basis of the Present Fertilizer Industry

Acid Phosphate

A Huge Industry That Does Credit to the Engineer and the Plant Manager, but Involves a Tremendous Waste of Raw Material at the Mine and Losses Due to Inadequate Fundamental Research

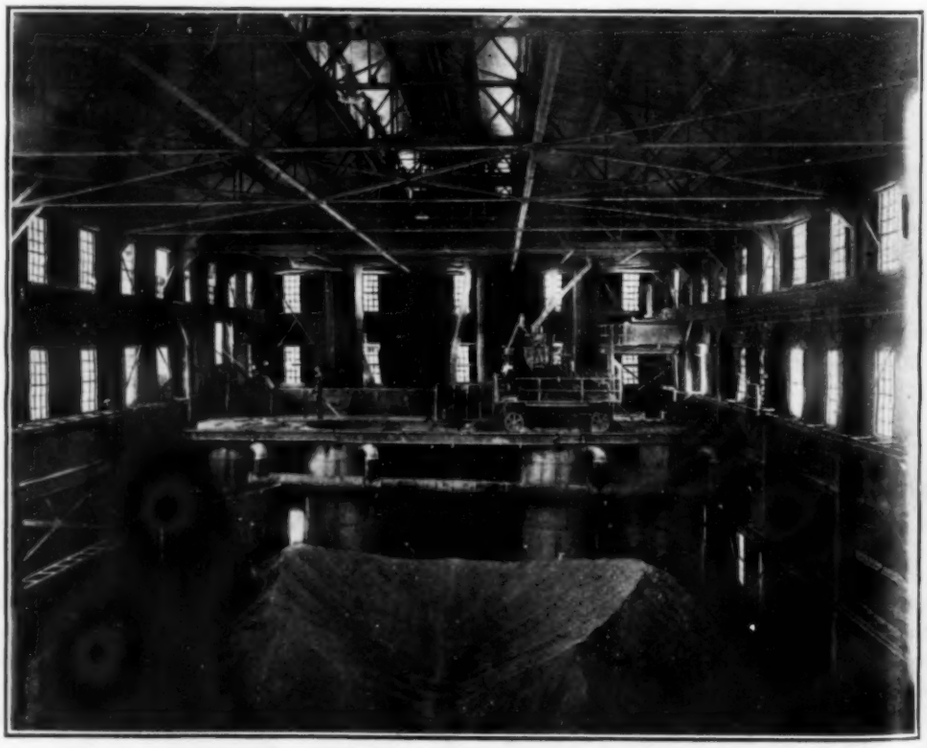
By W. H. Waggaman and H. W. Easterwood
Bureau of Soils, Department of Agriculture

THE development of the process of acidulating phosphates in order to render them water soluble has not only proved a great boon to agriculture, but has also stimulated directly or indirectly many other industries. Our knowledge of this process led to the geologic investigations through which many of our more important deposits of phosphate rock were discovered; it has done much toward improving the character and type of crushing, grinding and mixing machinery; it is largely responsible for the extensive manufacture and use of phosphate baking powders; to acid phosphate we mainly owe our immense annual output of sulphuric acid; and were it not for fertilizers containing acid phosphate as their basic ingredient, it is unlikely that the fertilizer industry would have reached such huge proportions or that our crop yields could have been maintained at their present high level. Yet paradoxical as it may appear, the development of the acid phosphate industry is in a measure responsible for the immense loss and wastage of the natural phosphates which it is our object to utilize. For under the present system of manufacturing soluble phosphates, a ton of phosphoric acid is probably discarded in the form of finely divided mineral or as low-grade phosphatic ore for every ton marketed as high-grade phosphate rock.

The proposal to treat bones, guano and relatively insoluble phosphates with sulphuric acid was made by Liebig before the middle of the last century, and in 1840 Lawes took out a patent in England covering this general process. Acidulated phosphates soon gained favor in this country, and at the factory of one of the pioneer fertilizer companies in Baltimore the original tubs or vats in which sulphuric acid and phosphate material were mixed by hand are on exhibition. The first materials to be thus treated were bones and weathered guanos, but while the process of acidulation increased the solubility of such phosphates, the product obtained in these early days was somewhat irregular in composition and often in rather poor mechanical condition.

This was due to the following causes: (1) An incomplete understanding of the action of sulphuric acid upon the various impurities occurring in natural phosphates and the consequent lack of chemical control over the raw materials entering into the manufacture of acid phosphate. (2) The limited knowledge of the importance of sulphuric acid concentration upon the rate and thoroughness of the chemical reactions and the mechanical condition of product. (3) The use of coarsely ground phosphates which were incompletely attacked by sulphuric acid. (4) The employment of hand labor in mixing the acid and rock, which made it impracticable to obtain the intimate contact necessary for rapid and complete reaction. (5) The dumping of the freshly prepared material upon open piles almost immediately after mixing, a practice which so cooled the mass that the chemical reactions were checked and the moisture content of the product was objectionably high.

A better understanding of the process of acidulating phosphates, however, soon grew up, which resulted in



INTERIOR VIEW OF A MODERN ACID PHOSPHATE FACTORY, SHOWING THE MIXER AND DENS OF THE SILO TYPE IN THE BACKGROUND
(Photo furnished through courtesy of Southern Fertilizer & Chemical Co., Savannah, Ga.)

more economical and efficient methods being introduced. Accurately weighed charges of phosphate rock and sulphuric acid, the composition and strength of which are definitely known, have replaced the loose approximations of the early days. Fertilizer machinery for grinding, mixing, curing and disintegrating materials has reached such a high degree of perfection that there is no longer any excuse for incompletely acidulated phosphates due to improper grinding or mixing of the raw materials, nor any reason for delay in curing and shipping acid phosphate for lack of the proper mechanical facilities. But while the mechanics of this process have been pretty thoroughly worked out, there still appears to be room for further chemical research, in fact even up to the present day some of those engaged in the production of this commodity have very little knowledge of the reactions involved and are unfamiliar with certain details in its manufacture which are of considerable commercial significance. It is still reasonable to expect that a more thorough study of the action of sulphuric acid upon the various ingredients occurring in phosphate rock and a better understanding of the effect of the compounds thus produced upon the final product might lead to economies in acid consumption, a fuller utilization of our phosphate resources and a curtailment of the waste incident to the preparation of relatively pure phosphate rock.

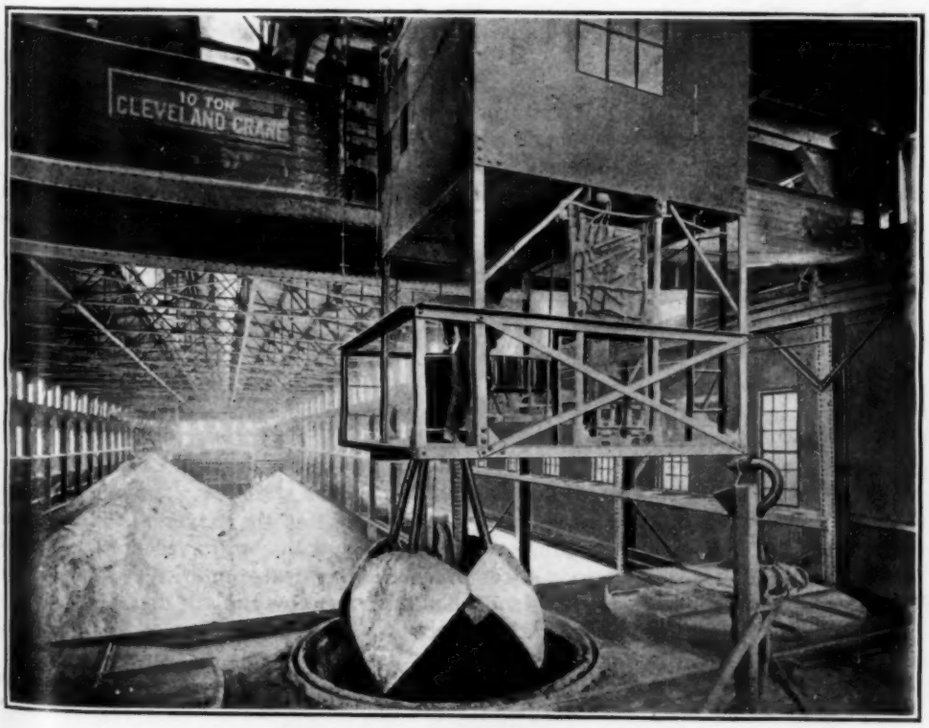
Demand for High-Grade Phosphate Rock

If phosphate rock were practically pure tricalcium phosphate, its treatment with sulphuric acid and the preparation of a uniform product of the proper chemical composition and in good mechanical condition would present but little difficulty. But practically all of the phosphate rock offered on the market today contains various amounts of such impurities as organic matter, iron, and aluminum compounds, fluorides, and carbonates, all of which consume a certain amount of acid and form products affecting the chemical composition and physical properties of the acid phosphate.

It is hardly within the scope of this article to discuss in detail the reactions involved in acidulating an average grade of phosphate rock; suffice it to say that some of these reactions are but imperfectly understood, with the result that only a few of the ingredients present in the rock are usually determined. The impurities considered the most objectionable and those over which close chemical control is nearly always exercised are iron and aluminum oxides or phosphates, but even in the case of these ingredients the setting of the limits beyond which they must not rise has been largely based on the average factory experience and not determined by fundamental scientific research.

While some of the manufacturers may not be very familiar with the chemistry of this process, it has been generally known for a long time that certain impurities not only consume considerable quantities of sulphuric acid but sometimes cause the product to have undesirable properties. Therefore ever since the introduction of acidulated phosphates the demand has been for higher and higher grade raw materials which would enable the manufacturer to avoid any loss due either to the presence of insoluble phosphoric acid or to the rejection of this product because of its poor mechanical condition. The result of this tendency to manufacture acid phosphate by the rule-of-thumb method, using as far as possible relatively pure materials, has been that every effort is being expended in obtaining high-grade phosphate mineral at the mines, frequently at the sacrifice of large quantities of phosphoric acid in the form of low-grade rock which might be utilized had more careful research been conducted in the manufacture of acid phosphate or had other processes been developed wherein certain impurities would not adversely affect the availability of the product.

The general plan followed and the main ends sought in producing this commodity today are practically the same as when its production was first proposed, but efficient mechanical devices for grinding the phosphate rock, for mixing it with sulphuric acid, for the quick curing, conditioning and disintegration of the product have almost entirely displaced the hand labor of former days. The four principal points sought in the manufacture of acid phosphate are: First, to obtain a product containing the maximum percentage of P_2O_5 soluble in the conventional medium (neutral ammonium citrate) designated by the American Association of Official Agricultural Chemists as a measure of the availability of phosphates. Second, the elimination of the maximum amount of moisture whereby the percentage of P_2O_5 is not only increased but the mechanical condition of the



ORANGE-PEEL GRAB BUCKET SUSPENDED FROM OVERHEAD TRAVELING CRANE
This apparatus is used in excavating dens of the silo type and conveying the product to and from the storage piles. (Photo furnished through courtesy of Southern Fertilizer & Chemical Co., Savannah, Ga.)

product improved. Third, the bringing about of the desired chemical reactions and the drying and conditioning of the product so it may be shipped in the least possible time. Fourth, the employment of the smallest possible amount of sulphuric acid to obtain the results enumerated above.

By the use of high-grade phosphate rock and the most up-to-date mechanical equipment the first three conditions have been satisfactorily met, but though manufacturers have expended much effort in attempting materially to reduce the amount of sulphuric acid necessary to change the phosphate into an available form they have never been entirely successful.

Complete Decomposition of Phosphate Rock

The perfection of grinding machinery and devices for segregating coarse and fine particles either by screens or by air separation devices makes it possible to obtain at low cost material in a very finely pulverized condition. This has proved of immense value in the manufacture of acid phosphate, both from the standpoint of the rapidity as well as the completeness of the reaction between the rock and sulphuric acid. Mechanical devices capable of thoroughly commingling the acid and rock in batches of a ton or more within a period of 3 minutes insures a uniform mixture and subsequent rapid chemical action throughout the mass. With these mechanical devices there is little chance for particles of rock to be undecomposed or partially acidulated either because of their size or because the acid and rock were not uniformly mixed.

The concentration of sulphuric acid best adapted for the decomposition of phosphate rock has also been pretty accurately determined through long-time experience. This concentration which is now almost universally employed falls within relatively narrow limits (50 to 52 deg. Bé.); and acid of this strength has much to recommend it. First, it contains enough water to reduce its viscosity and render it easy to mix with the rock. Second, such acid has a solvent effect sufficient to prevent the calcium sulphate produced from coating the phosphate particles and preventing their complete decomposition. Third, since acid of this concentration is obtained by diluting sulphuric acid of 60 deg. Bé., which is the strength at which it is ordinarily shipped, the manufacturer can utilize the heat generated by the addition of water to the stronger acid in raising the temperature of this reagent during the winter months or in acidulating phosphates which are not so readily attacked by cold acid.

Elimination of Moisture From Acid Phosphate

Before the introduction of the closed chamber or "den" wherein the main reactions involved between sulphuric acid and phosphate rock take place, the freshly mixed materials were discharged on an open pile or allowed to remain in the original mixing device until the reactions were supposed to have been completed. Not only did these methods delay greatly the final reactions but often prevented them from going to an end. Moreover, the rapid cooling of the mass prevented the elimination of moisture which is so important in obtaining a product in the proper mechanical condition for its ready distribution in the drill. The open pile or dump method is still employed in a few plants, but in most cases has been displaced by the "den" system, wherein the heat of chemical energy is utilized to complete the reactions in the least possible time and also to eliminate

ONE OF THE LATEST TYPES OF COMPLETE UNITS FOR THE RAPID MANUFACTURE, EXCAVATION, AERATION AND CONDITIONING OF ACID PHOSPHATE

(Cut furnished through the courtesy of the Sturtevant Mill Co., Boston, Mass.)

from the product the maximum amount of moisture. The resulting product does not form solid cakes.

Acid phosphate dens were originally constructed almost entirely of timber, but in recent years reinforced concrete has largely supplanted wood for this purpose. One of the favorite types today is built in cylindrical or silo form, there being several of these dens surmounted by a platform and track upon which is located the mixing machinery so arranged that it can serve each den in turn. Mechanical excavators consisting of clamshell or orange-peel buckets suspended from overhead traveling cranes have now also largely supplanted hand labor with the danger and inconvenience incident thereto. These excavators not only transfer the acid phosphate to the storage pile for final curing but also pick it up again when it is ready to be milled and mixed with other ingredients to make up complete fertilizers.

Conditioning and Curing Devices

Within the past few years, however, a number of complete units have been invented having for their object the very rapid and in some cases the continual manufacture, curing and conditioning of acid phosphate, thus reducing to a minimum the amount of storage space necessary in a plant having a large potential production. The two following systems are taken as typical examples of how the manufacture and conditioning of acid phosphate may be brought about in the shortest possible time.

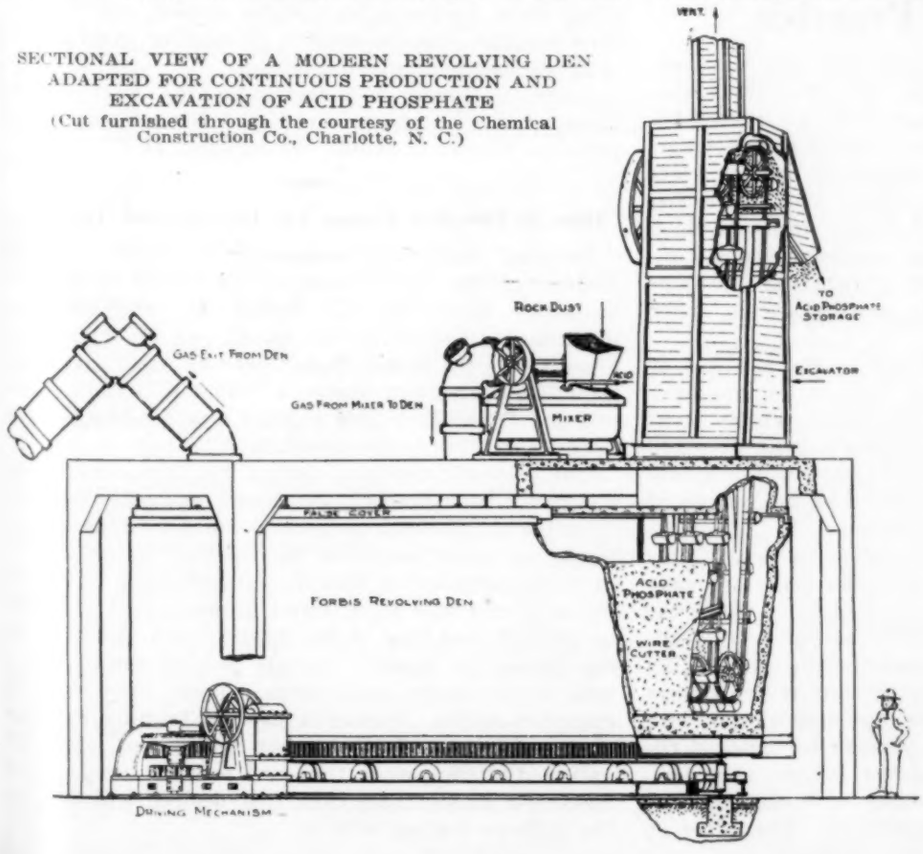
The first type consists of an annular concrete den of relatively large proportions, so constructed that either the den itself or the top of the den (carrying the mixing machinery) revolves on its vertical axis. Effective means are provided to seal the joint between the den and its top, thus preventing the noxious fumes from escaping except through a flue provided for this purpose. A combined cutting device and excavator is also mounted on the platform or cover of the den, and extending down into the den, shaves off thin sections of the porous mass, elevates it and dumps it onto a storage bin or directly upon the pile for final curing. The excavator is so spaced from the mixer that it cuts and removes only the acid phosphate that has been in the den the longest period of time, the speed of the apparatus being so regulated that the material excavated is at least 8

hours old. Means are also provided for leading the fumes evolved from the mixing pan into the den and hence through a flue into an absorption or water spray system which absorbs or decomposes the noxious gases and vapors.

The other type of den designed for the rapid manufacture and curing of acid phosphate is rectangular in form with wooden walls and a concrete base to which the rear wall is rigidly fastened. The side walls of this den are hinged at the top so as to allow them to swing outwardly when the den is being excavated. These side walls as well as the excavating device are suspended from a carriage which moves backward and forward upon an elevated track. The excavator, which is directly in front of this den, consists of a circular framework bolted to a vertical shaft and carrying a system of aërating fans and a series of cutting or shaving knives arranged in staggered relation to one another. The front end or door of the den is suspended by chains from a rigid superstructure, which also carries the weighing devices and the mixer for the acid and rock.

In operating this den the front door is lowered and the sides fastened at the bottom by wedges to prevent their swinging outward. The den is then filled in the usual manner with weighed charges of acid and phosphate rock which have been thoroughly stirred in a special type of mechanical mixer. After the material has set, the front door of the den is raised, the wedges removed from the lower end of the side walls, allowing them to swing free, and the carriage from which the den walls and the excavator are suspended is moved backward by mechanical means at a slow and uniform rate, exposing the block of acid phosphate to the action of the excavator, which cuts its way into the mass, shaving off thin sections, which are at the same time aërated by the fans carried on the excavator. The disintegrated phosphate falls upon a conveyor at the side of the apparatus and is carried to a pile for final curing or to the bagging machine to be sacked and shipped.

SECTIONAL VIEW OF A MODERN REVOLVING DEN ADAPTED FOR CONTINUOUS PRODUCTION AND EXCAVATION OF ACID PHOSPHATE
(Cut furnished through the courtesy of the Chemical Construction Co., Charlotte, N. C.)



Sulphuric Acid Economy

The fourth end sought—namely, the reduction of the quantity of sulphuric acid to the lowest point where it is still theoretically possible to produce available phosphate—has never been satisfactorily solved. In the early days of acid phosphate manufacture it was considered highly important so to treat phosphate rock that the maximum percentage of water-soluble phosphate was obtained. Later experience and subsequent regulations, however, made it seem unnecessary and in some cases undesirable from both the manufacturer's and agriculturist's viewpoint to have the phosphoric acid entirely soluble in water. A comparison of the two reactions, either of which will give available phosphoric acid, is made below, equation 1 giving water-soluble phosphoric acid and equation 2 phosphoric acid in a citrate soluble (so-called available) form:

1. $Ca_3(PO_4)_2 + 2H_2SO_4 = CaH_4(PO_4)_2 + 2CaSO_4$
2. $Ca_3(PO_4)_2 + H_2SO_4 = 2CaHPO_4 + CaSO_4$

It is obvious from equation 2 that if phosphate rock could be acidulated to the point where only dicalcium phosphate or citrate soluble phosphoric acid were formed, a great saving in sulphuric acid could be effected and a corresponding increase in the percentage of P_2O_5 in the product would be obtained. But when the theoretical quantity of acid required to convert tricalcium phosphate into the dicalcium form is added to the rock, the final mixture consists chiefly of monocalcium phosphate and unattacked phosphate rock. This result is accounted for by the fact that tricalcium phosphate is very readily attacked by sulphuric acid, but the tendency of the reaction is to go to an end so that either phosphoric acid or monocalcium phosphate is formed. While phosphoric acid is an active reagent, monocalcium phosphate has rather weak acid properties and does not readily react with the tricalcium salt. Hence phosphate rock so treated always contains a high percentage of insoluble phosphoric acid even after it has been allowed to stand for a long period of time. It is entirely feasible, however, to produce dicalcium phosphate by the treatment of acid phosphate with limestone, or burned or slaked lime, and this has often been done where a prejudice exists against soluble phosphates because of their acid properties. Such practice, however, is not economical since it involves additional mixing and handling and the further dilution of the final product. While considerable work has been conducted with a view to reducing the quantity of sulphuric acid necessary in producing citrate soluble phosphoric acid without much success the problem

does not appear insurmountable and seems well worthy of further research.

The acid phosphate industry in this country is a credit to the ingenuity of the American engineer and to the experience and skill of the factory superintendent. It does not, however, reflect great credit upon the chemist and the conservationist. From the standpoint of water-solubility, mechanical condition and quantity production acid phosphate has reached a high degree of perfection. Everything considered, it is also produced at a relatively low cost. But from the standpoint of the efficient utilization of our raw materials and the economic handling and shipping of the finished product, acid phosphate does not measure up to the other manufactured fertilizer products.

We use in this country for fertilizer purposes more than twice as much phosphoric acid as we do of potash and nitrogen compounds, yet the standard carrier of phosphoric acid contains an average of only 16 per cent of P_2O, whereas potash salts contain from 40 to 50 per cent K_2O and manufactured nitrogen compounds such as ammonium sulphate, nitrate of soda and cyanamide contain from 19 to 25 per cent of NH_3.

Not only does the production of acid phosphate involve immense losses of rock at the mines but the finished product actually contains a lower percentage of fertilizer ingredients than the raw material from which it is derived.

It would seem, therefore, that the widest field for research and the greatest opportunity for advancing the fertilizer industry lies in improving existing methods and devising new and more efficient processes for manufacturing available phosphates.

Working to Avoid Tar Emulsions in Water-Gas Practice

IN NUMEROUS water-gas plants difficulty has been experienced in separating the tar from the water that is simultaneously condensed from the gas. This difficulty was so serious that the research committee of the Illinois Gas Association suggested it as a problem warranting study and investigation. The suggestion was accepted by the Bureau of Mines, which made a brief investigation of these tar emulsions, consisting in the main of a laboratory study of tars and emulsions collected from different plants and produced under different operating conditions.

The purpose of the work was not to find a means of separating tar-water emulsions, but rather to learn more about their formation, with the thought in mind that such information might lead the way to a method of operating that would avoid the formation of obstinate emulsions. Methods are recommended by the Bureau of Mines that greatly reduce the difficulty.

In the manufacture of carbureted water gas the only fuel used directly other than the generator coke is the carbureting oil. As the substances of which tar is composed are driven from the coal in coking, the source of water-gas tar is primarily the carbureting oil. In the water-gas process the aim is to convert as much of the oil as possible into a fixed gas with an average heating value high enough to carburet the blue gas. This conversion is never 100 per cent complete, because appreciable amounts of carbon and of condensable tarry matter always form. The latter on condensing is known as water-gas tar; it may be composed entirely of substances formed by the cracking of the oil or it may contain an appreciable amount of some of the original constituents of the oil. It is not uniform in character and quality; rather the product of one plant is frequently altogether different from that of another plant. The reason for these differences is that the operating conditions, oil used, gas standard, etc., are not the same in all plants.

The tar may be brown, thin or watery, contain a large percentage of light oils, and have a specific gravity but little greater than 1.00; or it may be black liquid, of molasses-like consistency, containing a much smaller percentage of light oil and having a specific gravity of 1.15 or more. Again, a water-gas tar may contain little or much free carbon and naphthalene.

Obviously, in specifying tar for a particular purpose, a water-gas tar cannot be either condemned or recommended unless the properties of that tar are known.

A water-gas tar emulsion is a tar, produced as described, having in suspension small droplets of water that do not readily separate from the tar. The percentage of water that can be thus retained may be as high as 85 per cent. It is not customary, however, to think of a tar as an emulsion when its water content is as low as 1 to 5 per cent.

The consistency of the emulsion depends, other things being equal, on the percentage of water dispersed in the tar. The greater the percentage of water present the more viscous the emulsion. At ordinary room temperature an emulsion containing 70 to 75 per cent water is usually thick and buttery, but one containing 2 per cent of water is approximately as fluid as a water-free tar.

The size of the droplets of dispersed water is not the same in all tar emulsions or in any particular one, but other things being equal, the most obstinate emulsions, those having a high water content and not settling readily, contain droplets of smaller average size than the less permanent emulsions.

Technical Paper 304 describing the work of the bureau may be obtained from the Department of the Interior, Bureau of Mines, Washington, D. C.

How to Prepare Sumac for Dyeing and Tanning

Detailed information concerning the kinds of sumac desired by the extract makers, the proper methods of gathering, harvesting and curing the leaves and suggestions for improving the quality of the article are given in United States Department of Agriculture Bulletin 706, "American Sumac, a Valuable Tanning Material and Dyestuff." This bulletin may be obtained free upon application to the department.

Our domestic source of tannin, the American sumac, has never been properly developed, say officials of the department, although American sumac contains practically as much tannin as the Sicilian variety. However, owing to lack of care in gathering and curing the leaves of this wild plant, which grows in vast quantities on uncultivated land in the Eastern and Middle Western states, the domestic article now on the market is inferior in quality and brings a lower price than the imported article. Sumac is used in tanning light colored and special leathers, but unless the leaves are gathered at the proper time and properly prepared for market, a darker color than that desired will be given the leathers treated with it.

Substances That Prevent the Jellying of Tung Oil

Glycerine, Among Other Materials, Produces Interesting Effects That May Prove Useful in Varnish Making

By F. H. Rhodes and T. J. Potts
Department of Chemistry, Cornell University, Ithaca, N. Y.

It is well known that the gelatinization of tung oil on heating may be delayed or prevented by the addition of certain substances to the oil. Many of the tests used for determining the purity of tung oil are based upon this effect of adulterants in retarding gelatinization; while in the manufacture of varnishes advantage is taken of the fact that certain resins or oils, when present in sufficient amounts, permit the tung oil to be "bodied" without danger of polymerization. A considerable amount of work has been done upon the effect of small amounts of impurities in delaying the gelatinization of tung oil, but practically no information has been published as to the relative effects of comparatively large amounts of impurities in preventing gelatinization when the oil is heated. The work described in this present article was undertaken for the purpose of determining the comparative efficiencies of various substances in preventing the gelatinization of tung oil on heating.

The apparatus used in this work consisted essentially of an oil bath which was maintained at a constant and uniform temperature of 282 deg. C. The cover of the oil bath was provided with eight openings, through each of which an ordinary (15x1.5 cm.) test tube was inserted so that the lower portion of each tube was immersed in the oil. Mixtures containing known proportions of tung oil and the added substances were prepared. When necessary, the foreign substance was dissolved in the oil by gentle warming. Five cubic centimeters of each mixture was put in each of eight test tubes, a glass rod was inserted in each tube, and the tubes were inserted in the oil bath. The time required for the oil to gelatinize was then noted. Gelatinization was assumed to have taken place when the tube could be lifted from the bath by the rod inserted in the oil.

The tung oil used in this work was from a lot of pure tung oil obtained from S. C. Gilespie & Sons. It showed the following analysis:

Sp.gr. at 15.5 C	0.9435
Refractive index at 25 deg. C	1.5192
Iodine number	157
Saponification number	189
Acid number	4.1
Browne heat test	9.75 minutes

The substances of which the effect upon the rate of gelatinization were studied were:

Raw rosin, acid number 164.8.
Paracoumarone resin, varnish grade, melting point 135 deg. C.
Ester gum, acid number 19.7.
Glycerine, U.S.P.
Linseed oil, pure.
Oleic acid, pure.

The effect of these various substances upon the rate of gelatinization of the tung oil are presented in the accompanying table, and are shown graphically in Fig. 1. It is apparent that, upon the basis of their efficiencies in preventing gelatinization, the various substances stand in the following order: Glycerine, oleic acid, rosin, ester gum, paracoumarone resin and linseed oil.

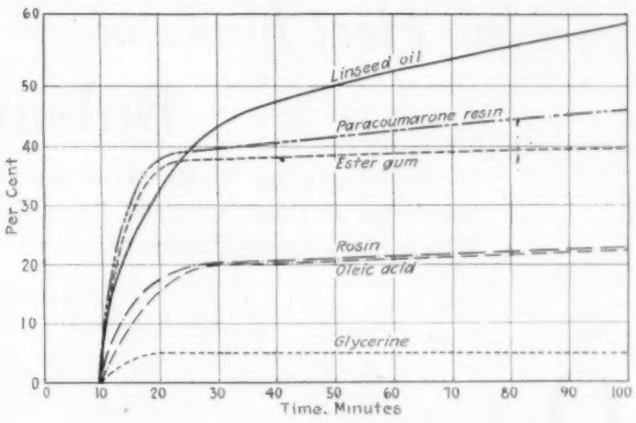


FIG. 1—TIME REQUIRED FOR GELATINIZATION OF TUNG OIL TO WHICH VARIOUS SUBSTANCES HAVE BEEN ADDED

TABLE I—EFFECT OF VARIOUS SUBSTANCES ON GELATINIZATION OF TUNG OIL

Substance Per Cent By Wt.	Time Required for Gelatinization (Minutes) Glycerine	Rosin	Oleic Acid	Ester Gum	Para-coumarone	Linseed Oil
0	9.75	9.75	9.75	9.75	9.75	9.75
1	.....	9.97	.....	9.92	9.78	9.83
3	13.38	.....	.....	.....	.....	.....
5	105	11	11.96	.....	10.16	.....
10	120+	12.8	.....	10.75	12.25	11.416
11	.....	.....	15.89	.....	.....	.....
15	.....	17	.....	.....	.....	.....
20	.....	25.83	40.22	.....	.....	.....
22	.....	85(a)	82	.....	.....	.....
25	.....	90+	105+	13.96	13.95	17.42
30	.....	.....	120+	.....	.....	.....
35	.....	.....	.....	18.67	.....	22.25
38	.....	.....	.....	35.17	.....	.....
40	.....	.....	.....	90+	34.45	25.83
45	.....	.....	.....	.....	*79.5	31.9
50	.....	.....	.....	.....	120+	48.4
55	.....	.....	.....	.....	.....	70.6
60	.....	.....	.....	.....	.....	105+

* Mixture became very thick and viscous, but did not actually gelatinize.

The effect of glycerine is very interesting. By the addition of even as small an amount as 6 per cent of glycerine it is possible to prevent the gelatinization of tung oil, so that oil containing a little glycerine may be bodied without difficulty. Samples of tung oil were mixed with small amounts of glycerine and with sufficient lead linoleate to give 0.02 per cent of lead in the oil and the mixtures were heated to 280 deg. C. until the tung oil was sufficiently bodied. The bodied oils were then cooled, thinned with a little turpentine, and painted out on glass plates. Drying took place rapidly, and smooth, tough, transparent films were obtained. Varnishes also were prepared by adding small amounts of glycerine and drier to the raw tung oil, bodying the oil as described above, dissolving paracoumarone resin in the bodied oil, and thinning with turpentine. These varnishes dried rapidly to give satisfactory films.

Further work on the use of glycerine in preventing the gelatinization of tung oil in the manufacture of varnishes and of waterproof coatings is now in progress in this laboratory.

New Gelatine Source Developed

New sources of food gelatine have been developed in Lower California, where great quantities of seaweed are being treated and reduced to a very clear and nearly tasteless vegetable gelatine of high quality, Consul Leighton Hope, Ensenada, informs the Department of Commerce.

A New Heat Insulator

Balsam-Wool

By Disintegrating Waste Wood and Rearranging the Fibers So as to Obtain a Maximum of Dead Air Cells, There Has Been Developed an Insulating Material Which Has a Lower Thermal Conductivity Than Balsa, the Lightest Natural Wood

By Howard F. Weiss
Wood Products Engineer, C. F. Burgess Laboratories, Madison, Wis.

ONE of the most inherently valuable properties of wood is its resistance to the passage of heat. It is for this reason that wood appeals to us for a variety of uses, such as furniture, tool handles, rims for automobile steering wheels, gun stocks, floors, etc. Substitutes find this property in wood a difficult one to overcome in the ever-present battle of replacements.

The reason wood is so resistant to the passage of heat is because of its structure. Unlike most construction materials, it is a built-up product made of a great mass of hollow fibers cemented together, as is evident in Fig. 1. These lock up within the wood an enormous number of air cells, so small that the air in them cannot readily circulate. The air is, therefore, commonly referred to as being "dead," and dead air is one of the most effective heat insulators known.

A fact not generally known is that the wood substance itself—that is, the material out of which the wood cells are made—is comparatively heavy and weighs about 96 lb. per cu.ft. Water weighs about 62.5 lb. per cu.ft. Hence, if solid wood substance is placed in water it will immediately sink. What keeps wood afloat, therefore, are the millions of dead air cells and cavities scattered throughout it. They buoy it up. It is well known that the different woods vary in weight, some being heavy and some light. This is because the heavy woods are largely solid wood substance and have comparatively few dead air cells, while the lighter woods have less wood substance and a large number of dead air cells. Oak and hickory are good examples of common heavy woods, while cedar and white pine are good examples of woods light in weight. The former weigh 40 or more pounds per cu.ft., while the latter weigh only about half as much.

If our belief that a material having a large number of dead air cells is a good heat insulator is correct, then we would expect to find that the woods that are lighter in weight are better heat insulators than the heavy woods. This is exactly the case. For example, the United States Bureau of Standards in studying the heat conductivity of various materials has found that balsa wood, which is one of the lightest woods known, shows remarkable resistance to the passage of heat. The results of the bureau's tests are shown in Table I.

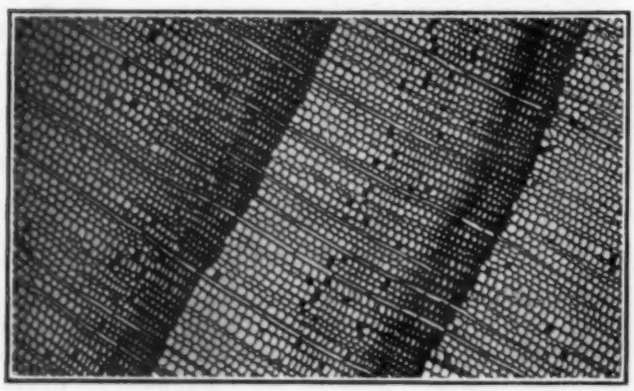


FIG. 1—CROSS-SECTION OF CONIFEROUS WOOD, SHOWING CELLULAR STRUCTURE

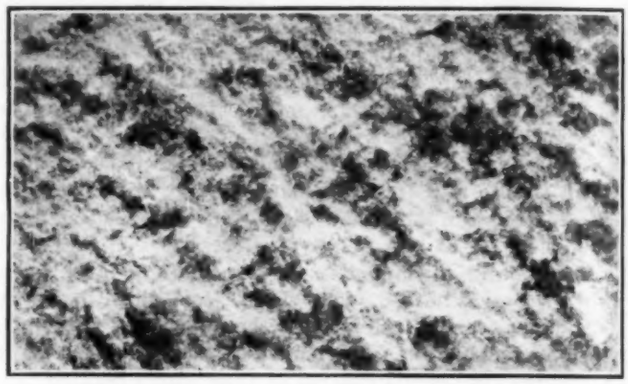


FIG. 2—BALSAM-WOOL, SHOWING FIBROUS STRUCTURE

TABLE I—THERMAL CONDUCTIVITY OF WOOD

Name of Wood	Weight, Lb. per Cu.Ft.	Conductivity, B.t.u. in 24 Hr., per Sq.Ft., 1 In. Thick, per Deg. F.
Balsa wood	7.5	8.3
White pine	30	19
Hard maple	45	27

Balsa wood weighing less than 8 lb. per cu.ft. shows a heat loss of only 8.3 B.t.u. under the bureau's test, as against 27 B.t.u. for maple, which weighs 45 lb. per cu.ft. In other words, a board of balsa wood 1 in. thick is as resistant to the passage of heat as a maple board more than 3¼ in. thick.

As this problem of preventing the passage of heat is of immense importance in our daily life, not only in the construction of ice boxes, refrigerator cars, pipes, etc., but in the building of comfortable homes, the C. F. Burgess Laboratories undertook a series of experiments to see if the fibrous structure of wood could be rearranged so as to build up a material that would be lighter than any wood heretofore known and that would have a greater number of dead air cells. It seemed logical that if this could be done a very efficient heat-insulating product would be the result.

After months of experimenting, the new product was finally developed. The material, to which the name Balsam-Wool has been given, weighs only 3 lb. per cu.ft., less than one-half as much as balsa wood and about one-fourth as much as cork. When tested for thermal conductivity, it showed the remarkably low thermal conductivity of 6.1 B.t.u., as against 8.3 for

TABLE II—COMPARATIVE THERMAL CONDUCTIVITIES OF VARIOUS BUILDING MATERIALS

Name of Material	Thickness Required to Equal ½ In. of Balsam-Wool, In.	Cost of Material per 1,000 Sq.Ft. Wall Surface for Thicknesses Required to Equal Insulation Value of ½ In. Balsam-Wool
Balsam-Wool	0.50	$50.00
Sheathing lumber	1.58	99.00
Common brick	8.00	350.00
Sheathing paper (solid)	1.59	570.00
Lime plaster	17.00	1,165.00
Stucco	17.00	1,165.00

balsa wood and 7.4 for pure cork, and these latter are the most efficient heat insulators made from wood heretofore known. The texture of Balsam-Wool is shown in Fig. 2.

The thermal conductivity of various building material compared with Balsam-Wool is shown in Table II. The prices are material costs only as of June, 1923, at Madison, Wis. If labor were included, the margins between Balsam-Wool and the other materials would be still greater.

Several patents were granted on both the product and process. The work was financed and the product is now being manufactured by the Wood Conversion Co., Cloquet, Minn., at the rate of 50,000 ft. per day under the trade name of "Balsam-Wool." About 2,000,000 sq.ft. was used in the construction of homes throughout Minnesota last fall and the returns now coming in from home owners show that the product is doing all that the laboratory tests indicate it would do —namely, saving these home owners from 30 to 40 per cent in coal and contributing to maintenance of comfortable, healthy, quiet homes.

Balsam-Wool can be made from those products of the sawmill too small in size to have commercial value. For its manufacture the slabs, edgings, trimmings, etc., left after the logs have been cut into lumber, box shooks and lath, are passed to a hog instead of to the burner and are cut to hog feed. This hog feed is further reduced in size by passing through a shredder so that the slivers are not over ½ in. in length. The shredded wood is then boiled in an alkaline solution to loosen the cementing material which binds the wood fibers together. The next step is to comb the fibers one from another, this being done in what is known as a beating engine. Thus the wood is reduced to individual fibers.

Having thus separated the individual fibers one from another, the next step is to build them up again, but in a different arrangement from that which nature gave them in the living tree. Before doing this, however, the fibers are passed through a fireproofing solution which renders the finished product fireproof. The fireproofed fibers are pressed until they hold only about 40 per cent moisture, after which they are passed through a drier in which their moisture content is reduced to 10 per cent. In this condition the fibers are blown into a large dry fiber bin. From this dry fiber bin the fibers are fed into a shredding engine and fan, which further comb out any fibers that may be in lumps or bundles. The fan then blows them to fiber hoods. These hoods are so designed that the stream of fibers is split into fan-shaped curtains of fiber which blow against a traveling wire screen 6 ft. wide, moving at a lineal speed of 12 ft. per minute. As the fibers are falling from the fiber hoods to the traveling screen, they pass through an atmosphere of cement that cements the fibers. Thus upon striking the screen the fibers are sticky and each fiber is cemented to its neighbor. However, the arrangement of the fibers is such that they project in all three dimensions so that the finished product has no grain as has the natural wood. It is because of this formation that the product is so extremely light in weight—only 3 lb. per cu.ft.

The endless wire screen carries the layer of wet sticky fibers with their water-resistant cement through a

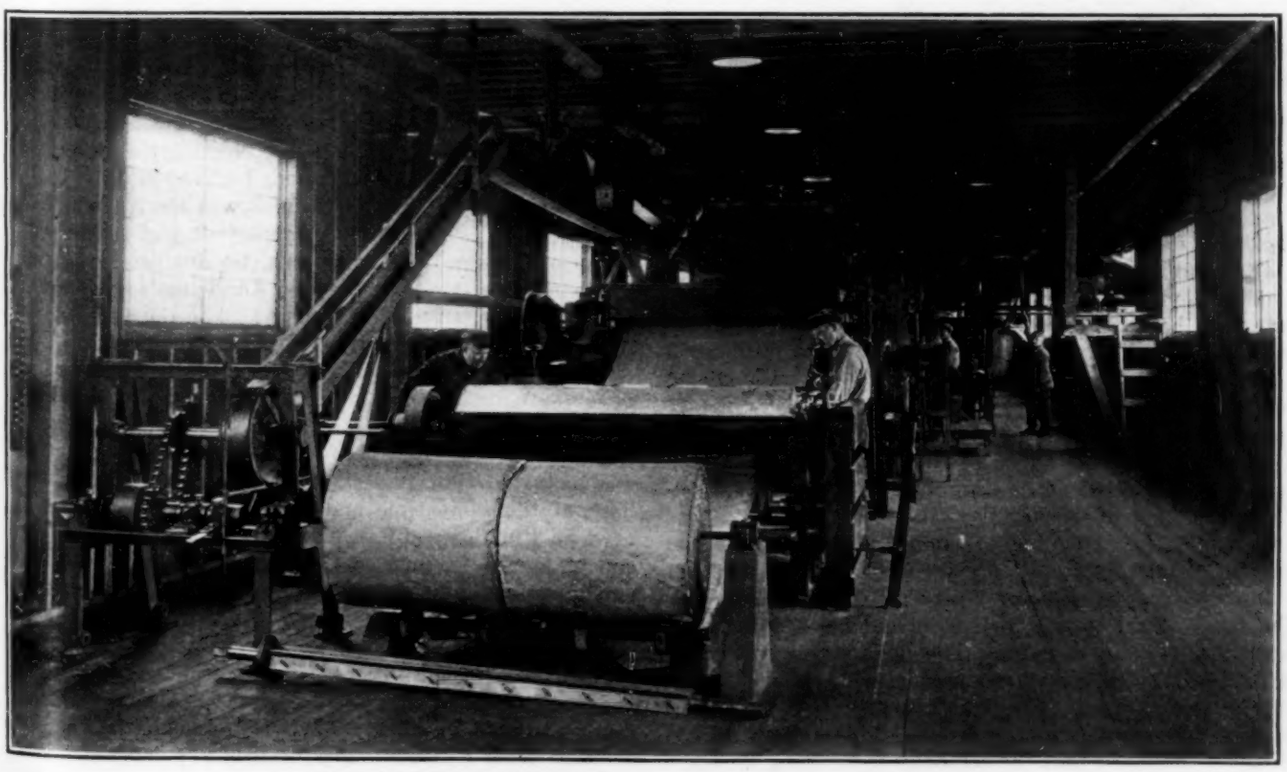


FIG. 3—WINDING AND SLITTING END OF FORMING MACHINE

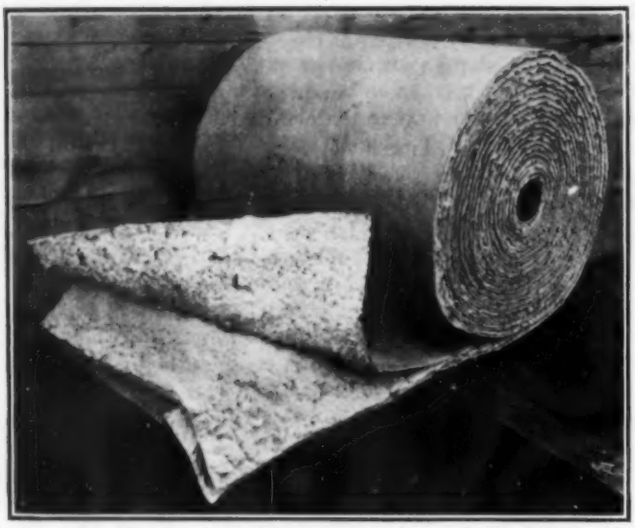


FIG. 4—BALSAM-WOOL READY FOR SHIPMENT AND APPLICATION

drier, where the water in the cement is evaporated and the fibrous product comes out at the other end of the drier in a continuous sheet 6 ft. wide and ¾ in. thick. This sheet of fibers is continuously clipped from the screen and passed between two sheets of tough kraft paper, coated on the inside with a thin layer of hot water-resisting asphalt. The "wool" thus coated on two sides with its layer of weather-resisting kraft liners passes through a slitting and cutting-off machine, which cuts it into lengths of 90 ft. and widths of 16½ and 32 in. (See Fig. 3). After this, the product is wound into rolls (Fig. 4) and wrapped with heavy layers of waterproofed paper. In this form it is ready for the market.

There are now on the market several varieties of heat insulators made from hair, seaweed, flax straw, waste sugar cane, pulp screenings, etc., but none of them, with the possible exception of hair, is as heat resistant as this new product made from the fibers of coniferous trees.

The public is rapidly learning that better construction in building homes is the cheapest and best policy, particularly in frame construction. Homes built of improperly seasoned lumber that shrinks and warps, causing plaster to crack, paint to peel, joints to open, etc., are expensive to maintain. Likewise, the public is demanding more and more comfort in every way. Cold, clammy, drafty, noisy houses are objectionable not only because of their uncomfortableness but also because of the expense of heating them. With good insulation, the home owner can have not only added health and comfort, but decided economy as well. It is estimated that good insulation will save from 25 to 40 per cent on the amount of fuel required to heat the home, the variation depending upon window area. Furthermore, a smaller heating plant will suffice and this saving (20 to 25 per cent) should about pay for the cost of insulation.

Uninsulated houses are becoming too expensive for the mass of the people to live in and more economical homes will be in demand. The field ahead for house insulation is therefore tremendous. Numerous industrial uses for this fire-resistant efficient insulating material also suggest themselves. These facts are so firmly established that the company is building an addition which will double the present capacity of the plant.

Corrosion of Electrolytic Iron

An Argument for the Necessity of Using Pure Iron as a Basis for Research Experiments

By W. E. Hughes, B.A., D.I.C.

In a recent communication to *Chemical & Metallurgical Engineering* (April 6, 1922), Dr. G. K. Burgess insists upon the great importance of establishing the purity of metal that is used as the material of research. Dr. Burgess mentions zinc; the present writer has insisted on this point in relation to work done with electrolytic iron as the material. (See *Journal Iron and Steel Institute*, 1920, C1, p. 333.) This matter of purity cannot be over-emphasized, especially in relation to electrodeposited metal. It is as vital to the results of metallurgical research as to the investigation of purely chemical problems. All students of chemistry know how the presence of small quantities of a foreign substance—for instance, water vapor, as noted in the work of H. B. Baker—will influence the properties of a chemical body as shown by its reactions. One has only to recall the word—catalysis.

Importance of Use of Pure Metal

The importance of the use of pure metal in metallurgical research has led to special work on the preparation of electrolytic iron at the Bureau of Standards. As stated by J. R. Cain and his collaborators in Bureau of Standards Scientific Paper 266 (1916): "It may be said that the iron-carbon diagram has never been worked out with pure iron-carbon alloys." This prompted the present work. Again, in connection with the corrosion of iron, the importance of the purity of the metal employed is shown by the results of the great number of researches that have been published which have had for their object the investigation of the influence of this or that second substance (which, in many cases, was present in very small amount only) upon the rate or extent of the corrosion of iron. Instances need not be cited; many are given in the text-books of Cushman and Gardner and of J. N. Friend. Nevertheless, it is found that many of the investigations into the problem of corrosion of iron have taken electrolytic iron as a suitable material to work upon, because it is reputed to be a pure form. Often Kahlbaum's electrolytic iron is mentioned as the material employed; and sometimes, because the iron is Kahlbaum's, no analysis is given. The statement that the iron is Kahlbaum's appears to be sufficient guarantee of purity.

The author's experience with electrolytic iron has made one fact very clear to him—namely, that it is never safe in any case to assume anything regarding the purity of any given sample of electrolytic iron from whatever source obtained. It can be, and has been, demonstrated that two samples deposited in the same bath at the same time and under the same conditions of deposition may differ markedly in composition. It can be shown further that different parts of the same small sample may differ in composition and internal structure. Instances of both facts have recently been given and illustrated by the author. ("The Electrodeposition of Iron," Bull. 6, Department of Scientific and Industrial Research, published by the Stationery Office, London, pp. 18-19, Figs. 47-51.) Moreover, the type of solution from which samples of iron are deposited is a consideration of great importance, as brought out by

Fig. 1—Specimen of electrolytic iron deposited in $CaCl_2$ + $FeCl_2$ solution.

Fig. 2—Specimen of electrolytic iron deposited in $FeSO_4$ + $MgSO_4$ solution.

A. Müller in *Metallurgie*, 1909, vol. 6, p. 145. The author wishes to emphasize this last point here, and to illustrate the fact that, as regards corrosion, the kind of solution used is a primary consideration.

The two types of baths that have been used for the electrodeposition of iron on any scale are those made from sulphates and chlorides respectively. Others have noticed (and my experience is the same) that, when chlorides are present in the solution, the deposits rust much more quickly than when they are absent. This fact is plainly illustrated in the photographs. The deposits shown in Figs. 1 and 2 were formed upon copper and thickly coppered steel cylinders respectively. The conditions and particulars of deposition are given in the following table. The tests were duplicated; the result (stated below) was the same:

	Deposit of Fig. 1	Deposit of Fig. 2
C. D.	120 amp./sq.ft. (13.5 amp./sq. dm.)	4.5 amp./sq.ft. (0.5 amp./sq. dm.)
Solution	Fischer-Langbein (ferrous and calcium chlorides) bath.*	Klein-Maximowitsch (ferrous and magnesium sulphates) bath.†
Temp.	100 deg. C. (approx.)	34 deg. C.
Time	1½ hours	24 hours
Aspect	Smooth, even, very finely crystalline	Smooth, even, more coarsely crystalline
Date of deposition	1918	1917

* D.P.P. No. 212,994 (1908).

† 1 lb. $FeSO_4$ aq., 4 oz. $MgSO_4$ aq., 1 imp. gal. water. See *Z. Elektrochem.*, 1905, vol. 11, p. 52.

The two samples depicted were dried out in a similar way—namely, swilled in cold and hot water consecutively and then completely dried with filter paper. They were then put away together, wrapped in filter paper, in the same box. It was found, in the result, that whereas the iron of sample 1 showed signs of rust after a few weeks, that of sample 2 (Fig. 2) still, after years, shows not a single speck of rust, even when closely examined under a strong magnifying lens or low-power objective. The same result is observed in the cases of the other two samples deposited at the same time as those illustrated, and has been observed in the cases of other samples also, deposited in solutions containing chlorides and sulphates respectively.

It is true that the conditions under which the two samples of iron were deposited were very different. But the difference in the conditions of deposition (other than the difference in solutions used) are such as would lead to the likelihood of the sample deposited in the sulphate bath showing rust earlier than the other.

These conditions lead to the structure of the former deposit being large grained and coarse internally while that of the other was fine grained and close; and deposits having the former structure are not infrequently found to contain greater amounts of impurity, especially electrolyte, than do deposits of a fine-grained and fibrous structure. It is, therefore, scarcely likely that the conditions of deposition had anything to do with the respective sensitiveness to rusting in the present case, and much more probable that the difference between the samples in this respect was due to the fact that the inclusion of chloride electrolyte in the one case, though smaller in amount than the inclusion of sulphate electrolyte in the other, was more active in promoting corrosion.

It is suggested that these two samples show very clearly how, considered as a whole, the properties of the iron depend upon the type of solution used for its deposition. And this shows the danger of taking any particular specimen of electrolytic iron for research work, especially where its history is unknown.

Mica—A Mineral of Many Uses

In the present electrical age mica supplies a need not filled by any other substance. Its non-conductivity of electricity and heat and its toughness, flexibility and elasticity make it invaluable in the electrical manufacturing industry. Before it was so employed it was probably used chiefly in glazing, for which large sheets of mica with perfect cleavage were required. Much mica that was then regarded as waste is now used in electrical and other industries by making it into "mica board," or built-up mica. Imperfect sheets of mica are also ground and used in the decoration of wall paper, in the manufacture of lubricants, in fancy paints, rubber goods, molded mica, and roofing papers, for covering steam pipes, and in many other ways.

The only commercially valuable varieties of mica mined in the United States, according to the Department of the Interior, Geological Survey, are biotite and muscovite. Biotite is a dark mineral, and its sheets are less flexible and elastic than those of muscovite. Muscovite is transparent or light colored when split into thin sheets. Mica mined for commercial use is commonly found in rough blocks, or "books," as they are called in the Western states. The outer shell of some of these blocks is partly crushed and broken and must be removed before the blocks can be cleaved into sheets. Many of these sheets are less than a thousandth of an inch thick, and some of the thin splittings prepared in India measure only one sixteen-hundredth of an inch.

Requirements for Wood Preserver

To protect wood from decay, a preservative must first of all be poisonous to wood-destroying fungi, according to *Wood Preserving News*. Decay in wood is not due to direct chemical action, or action of the elements, but is always the result of the activity of low forms of plant life which feed on the wood and thus destroy it. The preservative must also be able to penetrate the wood sufficiently to form a continuous exterior-treated shell, deeper than any surface checks which are likely to develop, and to retain its toxicity or poisoning power, under service conditions.

Properties and Commercial Uses of Isopropanol

A Recent Entry Among the Commercial Solvents —Physiological and Preservative Properties Are Compared With Ethyl Alcohol

By H. C. Fuller
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INCREASING interest in the possibilities of isopropanol as a solvent and preservative in the food and medicine industries has prompted an investigation of certain of its properties. To one familiar with isopropanol from a physical and chemical standpoint, its potential possibilities are at once apparent, and the investigations herein outlined were undertaken with a view to determine, in a practical way, the actual situation with respect to the uses for which it appeared to be suited.

It has been apparent that isopropanol has interesting possibilities as a solvent and preservative in the food and drug preparations. The investigations outlined in this article indicate that it can safely be used in mixtures to be applied externally to the body and in dentifrices and that it is superior to ethyl alcohol as a preservative and disinfectant.

As its chief claim for recognition as a valuable commercial commodity lay in its solvent and preservative properties, it seemed desirable to determine to what extent these characteristics were comparable with those of ethyl alcohol; and, if it should be substituted for the latter, to determine whether or not a product containing it would produce any detrimental reaction of the animal economy, and should there be any difference in the physiological action, whether this difference would be favorable or unfavorable to isopropanol.

References to the physiological action of isopropanol have occurred in increasing number in the scientific press during the past 2 or 3 years.

Grant (*American Perfumer*, 1921, vol. 16, p. 334) and later Grant and Johns (*Am. J. Pharm.*, 1922, vol. 94, p. 418) commented on the physiological properties of the substance as reported by Macht, Efron, Burton-Opitz, Sinclair and Straszewski. The first-named detailed the observations of the effect of intravenous injections of isopropanol on cats and its action on isolated frog hearts. Burton-Opitz also experimented intravenously and further tested the action of the vapor of isopropanol on the ocular system of rabbits and dogs, both of which subjects came through the experiences unscathed. Macht also compared the action on rats of the vapor of isopropanol with that of methyl alcohol and ethyl alcohol and came to the conclusion that neither ethyl alcohol nor isopropanol was injurious.

Sinclair tested the local effect of isopropanol on the skin of human subjects and open wounds in dogs, with the conclusion that no harmful effects, either local or systemic, resulted. Straszewki, discussing the use of the substance as a scalp, hair and mouth wash, attributed dangerous toxic properties to it, but his report was apparently based on speculation and not on experimental observation.

As the experiments thus far conducted had indicated that isopropanol was a substance of relatively low toxicity, and as it apparently had no effect on the optical system, it was decided expedient to note the reaction of human beings to its ingestion.

Grant and Johns, in the article previously noted, referred to Sinclair's tests of the local effects of ispropanol on the skin of human beings, the conclusions of the authors being that it was without harmful action.

Grant and Johns performed further tests which satisfied them that isopropanol could be safely used for irrigating wounds, rubbing onto the skin and scalp, and for local applications generally to the body surface. They used it in lotions for chapped hands and after shaving, in liniments, liquid soap and in antiseptic solutions for the throat; to cleanse small wounds and to dry and harden the skin of the hands when swollen by hot water and alkali. Sponge baths were taken in isopropanol of about 50 per cent concentration. Specimens were distributed to nurses and hospitals, and used, under medical supervision, for alcohol rubs on a number of patients. In no case was any injurious effect noted. In an intensive experiment five volunteers wore bandages saturated with undiluted isopropanol covering an area of about sixty square inches on the forearm for from 3 to 7 hours daily for four successive days, a total of 21 hours for each man. No harmful effects, either local or systemic, were noted.

G. Bernhardt (*Deut. Med. Wochschift*, 1922, vol. 48, pp. 68-9) has shown as a result of some experiments that isopropanol can replace ethyl alcohol as a disinfectant for the hands and that it acts in somewhat smaller concentration. This is verified by the tests made by the writer on bacteria and noted later in the article.

J. Pohl (*Biochem. Z.*, 1921, vol. 127, pp. 67-71) concludes from tests made on dogs and rabbits that small non-harmful doses of isopropanol are largely oxidized in the body, and that when given in small doses over a long period there is no inhibition of growth.

Loffe (*Seifensieder Ztg.*, 1921, vol. 48, p. 542-3) concludes that its use as a medium for cosmetic preparations and its use in mouth washes are entirely harmless.

Boruttau (*Deut. Med. Wochschr.*, 1921, vol. 47, pp. 747-8) found that isopropanol produced about the same effects on rabbits as ethyl alcohol. Small amounts could be given to animals per ounce or subcutaneously in proper dilutions for prolonged periods without harm.

Isopropanol (*Pharm. Zentrahl.*, 1922, No. 31) in solution of 35 to 50 per cent strength have given good results in facial acne and various diseases of the hair. Poultices containing 10 to 20 per cent solutions have proved useful in treating bacterial eczema.

The observations of those who have studied the effects of isopropanol warrant the conclusion that the animal economy is capable of absorbing reasonable amounts of this substance without the accompaniment of toxic results. It is, without doubt, sufficiently innocuous to be employed as a solvent and a preservative in the formulation of certain types of medicines, liniments, embrocations, rubbing compounds, dentifrices, antiseptic mouth washes, hair tonics, bay rums, perfumes and toilet waters.

A series of intensive experiments conducted by the

writer on lower animals and human beings has demonstrated that isopropanol has no deleterious action on the optical system. Its physiological action on the internal animal economy may be considered in general comparable with that of acetone, to which substance isopropanol is oxidized by metabolic changes. Acetone has enjoyed an unrestricted use for a long period, it is not a toxic substance, and the ingestion of isopropanol in the quantities that might enter the system through the administration of medicines and such food products as flavoring extracts would occasion no other reaction than that which might normally occur when the same quantity of acetone is consumed.

Comparing It With Ethyl Alcohol

Before embarking on a detailed discussion of the practical uses of isopropanol as a solvent, an account will be given of tests that were made to compare with ethyl alcohol its preservative action against yeasts and its preservative and disinfectant action against bacteria.

In the test against bacteria, increasing quantities were mixed with standard extracts broth and inoculated with *Bacillus typhosus*. After incubation, sub cultures were made whereby the disinfectant effect was determined. In the fermentation tests only the inhibitory values were recorded.

These tests demonstrate the superiority of isopropanol over ethyl alcohol as a preservative agent and as a disinfectant.

Its Practical Application

Isopropanol is a clear, colorless liquid which when pure has but a slight odor. It boils between 81 and 83 deg. C. It is miscible with water in all proportions and dissolves volatile oils, resins, many inorganic bodies and a large number of organic compounds, alkaloids and the like. In general, it may be said to parallel ethyl alcohol as a dissolving and holding agent.

Medicinals. As a solvent for preparing medicines and holding the active principles in solution, isopropanol has an almost unlimited field. A series of standard pharmaceuticals has been prepared and kept under observation for a long period without showing any change either in appearance or therapeutic value. These products include soap, liniment, spirit of camphor, aromatic spirit of ammonia, tincture of iodine, antiseptic liquid (liquor antisepticus), alkaline antiseptic liquid and many others for which there are prescribed standards in the U. S. Pharmacopoeia and National Formulary.

Mixed formulas such as pain killers and veterinary liniments built up with capsicum, camphor, ammonia, mustard oil, etc., with isopropanol as the vehicle have remained unchanged over long periods and are comparable in every way with the same mixtures made with ethyl alcohol.

Massage and rubbing mixtures combining the virtues of camphor, thymol, menthol and eucalyptol in isopropanol have been found to be stimulating and cooling to the skin and muscles.

Dentifrices. For preparing mouth washes, isopropanol furnishes a satisfactory medicine for combining the characteristic oils such as gaultheria, eucalyptus, pine and coriander with thymol, menthol, phenol, cresol, boric acid, ammonium chloride, sodium benzoate, borax and potassium carbonate.

Tooth washes made with soap, myrrh, oils of cassia, clove and those above mentioned, and colored characteristically with cudbear, cochineal, rosolic acid and methyl orange can be made with isopropanol.

Toilet Preparations. For all types of hair tonics, isopropanol can be employed to advantage as a solvent for the medication commonly employed such as resorcin, salicylic acid and quinine, the extracts of pilocarpus and sage, and the characteristic perfuming oils such as lavender, rosemary and bergamot.

Bay rums, as well as the spirit of myrcia of the National Formulary, have been made with isopropanol as the vehicle, and are indistinguishable in appearance and effects from those made with ethyl alcohol.

Isopropanol is an excellent solvent for the delicate essential oils, concentrates and artificial esters that are used in the multitude of colognes, perfumes, toilet waters and other preparations. The employment of a specially refined form of isopropanol will yield products equaling those made with cologne spirits and free from the objection that now obtains in the employment of alcohol denatured with a varied assortment of medicaments which often put decided limitations on the use of the solvent.

TABLE I—COMPARATIVE ACTION OF ISOPROPANOL AND ETHYL ALCOHOL AGAINST BACTERIA AND YEASTS

Bacteria					Yeasts
Technic: Preparations in the following quantities were mixed with 10 c.c. of standard extract broth, inoculated with one standard (4 mm.) loop of a vigorous 24 hr. broth culture of Bacillus typhosus "Rawlings"; cultured at 37.5 C. for 48 hr. and observed for inhibition; subcultured on agar to determine disinfectant strength.					Technic: Preparations in the following percentages of the substances mixed with standard fermentation liquor were planted with baker's yeast and incubated 24 hours at 36 deg. C.
Quantity of Preparation Used, c.c.	Isopropanol Inhb. Cult.	Isopropanol Sub. Cult.	Ethyl Alcohol Inhb. Cult.	Ethyl Alcohol Sub. Cult.	Percentage Mixture	Isopropanol	Ethyl Alcohol
0.1	*	*	*	*	7	*	*
0.2	*	*	*	*	8	*	*
0.3	*	*	*	*	9	*	*
0.4	*†	*	*	*	10	*	*
0.5	*†	*	*†	*	11	*	*
0.6	†	†	*†	*	12	*	*
0.7	†	†	†	*	13	*	*
0.8	†	†	†	†	14	†	*
0.9	†	†	†	†	15	†	*
1.0	†	†	†	†	16	†	†
1.1	†	†	†	†	17	†	†
1.2	†	†	†	†	18	†	†
1.3	†	†	†	†	19	†	†
1.4	†	†	†	†	20	†	†
1.5	†	†	†	†	21	†	†
					22	†	†
					23	†	†
					24	†	†
					25	†	†

Key: * Indicates positive growth. † Indicates no growth.

Perfumes and toilet waters of different types have been prepared with isopropanol as the dissolving medium, and after standing over long periods have shown no impairment in fragrance or appearance.

Histological Work. Isopropanol is a remarkable dehydrating and constricting agent, acting in this respect fully as strongly as does absolute ethyl alcohol. Its use in the pathological laboratory for dehydrating tissues, sterilizing instruments, dissolving stains, preserving specimens, etc., has been subjected to practical test and found satisfactory.

It would appear, therefore, that isopropanol is a substance that possesses solvent and preservative properties equaling and for certain purposes surpassing those of ethyl alcohol. Its fields of usefulness are many and varied, and in addition to its solvent and preservative properties, isopropanol enjoys the advantage of unrestricted sale in that it is not affected by the mass of regulations and difficulties incident thereto that now hamper the handling of ethyl alcohol.

Some of the Problems and Interesting Phenomena That Occur

In Adding Compounding Ingredients to

Rubber Latex

Are Discussed and Analyzed

By C. C. Loomis and H. E. Stump
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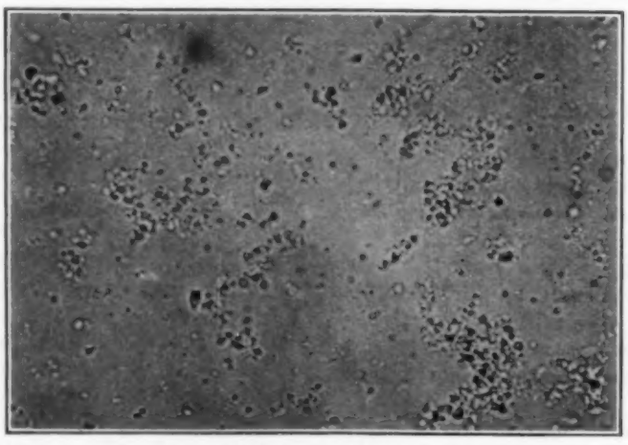
Courtesy of F. R. Henderson & Co.

IN THE compounding of latex it is well to forget most of what is known of the compounding of rubber either with breakdown machinery or rubber benzol. Both latex and rubber cement are rubber solutions, but their colloidal condition or state of aggregation is entirely different. In organic solvents, rubber behaves as a lyophilic colloid and swells up to form a gel with every appearance of a continuous structure. Under the microscope no individual particles can be seen. The type of solution is analogous to that of gelatin in water. Latex, on the other hand, is a lyophobic colloid consisting of particles of rubber dispersed in water and moving at random without any sort of orientation or structure.

Attention would not be called to this obvious difference if we had not found that many rubber chemists have overlooked it and if it were not of such fundamental importance in compounding. With breakdown machinery or rubber cements almost any filler can be added and the rubber will still be the external phase. The aim has been to get the finest possible fillers.

With latex, however, the condition often becomes reversed and the rubber particles tend to assume the internal phase. This is particularly likely to happen when the particle of the compounding material is small in comparison with the size of the latex particle.

The addition of fillers of the inorganic type presents a variety of problems. Finely divided materials such as are suitable for this use carry an electrical charge, and in case it is opposite to that of the latex particles, this may cause coagulation of the entire mass. Other fillers that carry the proper charge may have sufficient soluble material present to cause coagulation by the presence of a coagulation ion. Many materials such as clay, whiting, talc and silica can be added to latex in all proportions, if the precaution is first taken of wetting the dried material before adding it to the mix. The amount of water required will vary with the filler used, being probably dependent upon the water-absorption value of the material, but in any event the final mix will average about 50 per cent total solids in extreme concentrations. Zinc oxide can be mixed with latex in low percentages, but a slow agglomeration takes place, while higher percentages cause coagulation. Carbon black even in relatively small amounts causes coagulation. In this connection it is interesting to note the effect of different grades of the same filler on the rapidity of coagulation and the amounts that can be added without causing coagulation of the mass. Thus a high-grade superfine gas black will cause coagulation in percentages of 1 to 2 per cent, while the amount of coarser lamp black which can be added will run considerably higher. The answer is probably the magnitude of the electrical charge carried by the particles.



VULCANIZED LATEX

In general, there appears to be three fundamental causes for the coagulation of latex by the addition of fillers:

First, insufficient wetting of the particles. With materials which readily absorb water, there appears to be an actual absorption of the water, leaving the rubber particles behind in such concentrations that they coagulate. The remedy for this is obvious; to saturate the material with water before adding the latex. The quantity of water required varies greatly with the material. With substances such as ground silica a mere trace of moisture is sufficient, while with more absorbent materials such as china clay, enough water must be added to make a rather thick paste out of the material before it can be added to the latex.

The second cause of coagulation is the presence of a positive electrical charge on the particles of the filler of sufficient magnitude to discharge the negative charge on the rubber particle and bring about coagulation. There are two methods to combat this: First, the addition of some negatively charged material to the filler, to neutralize the positive charge before the latex is added. Second, the addition to the latex of further protective colloids other than those naturally present. This is far too detailed a subject to be gone into here, as the best type of protective colloid varies with the different fillers and the use to which the com-

pounded material is to be put. Scores of these materials have been investigated and many unexpected and interesting effects observed. Some of the broad groups that appear effective are the various classes of proteins and their hydrolysis products obtained by the action of enzymes, acids and alkalis; complex carbohydrates such as starches, dextrines, etc.; glucosides such as digitalin, saponin, etc.; a great variety of complex organic sulphonic and carboxylic acids and their salts and in some cases colloidal inorganic material.

The third general cause of coagulation on the addition of a filler is a slight solubility of one or more of its ingredients, which gives rise to a sufficient concentration of a coagulating ion to cause trouble. Here again two remedies may be applied: First, the addition of some non-coagulating material which will set free an ion that will form an insoluble compound with the troublesome ion or repress its solubility. Second, the addition of further protective colloids to the latex, as explained previously.

In Many Ways It Is a Most Remarkable Thing to Be Able to Mix Up the Compounding Ingredients With the Milk-like Latex and Then Coagulate and Vulcanize the Rubber Without Milling—The Industrial Possibilities of This Material Have Been Discussed in "Chem. & Met."—This Article Tells of Some of the Precautions That Are Necessary for Commercial Application

After a filler has been dispersed in latex by stirring, it will soon settle out again unless it is colloidal in nature. However, if the latex is subjected to the method of partial coagulation, as described in a previous article, the great increase in viscosity will hold the filler evenly dispersed indefinitely. (See *Chem. & Met.*, vol. 29, No. 5, p. 184, July 30, 1923.)

To compensate for some of these difficulties that have been encountered in the addition of ordinary rubber fillers to latex, there are many other substances which can be readily added to latex, materials that can be mixed with crude rubber or rubber cement only with the greatest difficulty. In general these are the water-soluble colloids, preferably of the irreversible type. One broad class of these are the colloidally precipitated metal salts, oxides and hydroxides, such as can be obtained with barium sulphate, aluminum hydroxide, silicic acid, etc. Owing to the extremely small particle size of these substances they usually tend to form the external phase and strongly modify the properties of the rubber. For example, a mixture of equal parts rubber (in the latex form) and colloidal silicic acid, on coagulating, pressing under a hydraulic press and drying, gave a dense white non-elastic mass somewhat resembling ivory. Naturally colloidal materials such as bentonite which swell in water to form a jelly can be similarly used, but the majority of these are reversible on drying.

Different Problems With Organic Fillers

Passing from the field of inorganic fillers to the organic ones, a different type of problem is encountered. Such materials as glue are colloids and the admixture with latex presents no particular difficulties. Casein, an analogous protein, can be handled in the same way, it being merely necessary to dissolve it in water, and insure neutrality or slightly alkaline conditions before adding it to the latex. As was previously mentioned, these materials are in the class of protective colloids, being of a lyophilic nature themselves, and if added in large proportions tend to become the external phase and strongly modify the properties of the rubber. Thus three parts rubber and one part glue is very short, but still tough and somewhat elastic, while a mixture of equal parts of glue and rubber resembles glue more than rubber, as the elasticity has disappeared, and when thoroughly dried, the material will break on bending.

Oils such as cottonseed, linseed, tung and other vegetable oils can in many cases be added directly to the latex if they are violently stirred. The alkaline nature of the latex seems sufficient in some cases to act as a protective colloid for the emulsification of the oils and a fair colloidal suspension of the oil in the latex can be obtained. It is safer, however, to make an emulsion of the oil first, using a protective colloid for this purpose, and then add the emulsion to the latex. The behavior of such mixed emulsion when coagulated and dried clearly shows the nature of such compounding. When first precipitated, the state of aggregation between the oil and the rubber is quite different from that obtained in mixing rolls. The particles of oil are evenly but heterogeneously distributed throughout the mix, but have not dissolved colloidally in the rubber to a homogeneous mass. For example, a mixture of equal parts of cottonseed oil and rubber can be obtained in this way which will have no tack for some time. On drying and standing for several days the mixture will slowly change to a gelatinous sticky mass similar to that which would be obtained on mixing rolls with crude rubber.

The vulcanized oils or factis are a different type of filler. Being insoluble in most common solvents, they do not lend themselves readily to emulsification and their addition is difficult. Some of the less highly vulcanized materials of a resinous type can be dissolved in suitable solvents and then emulsified. It should be noted, however, that the manufacture of stable emulsions of this type of material is rather difficult and that mere suspensions of the material in water will not suffice. A microscopic examination of the emulsion should show a dispersion approximating that of the latex to secure the best results.

A slightly different type of filler is the saponified oil or soap. Such materials, being strongly alkaline, can be added directly to the latex and insolublized by the precipitation of metallic soaps directly in the latex.

Mineral rubber, gilsonite, mineral oils and other such materials may be emulsified under suitable conditions. Such materials, if too solid or viscous to be emulsified directly, may be softened by suitable organic solvents and then emulsified. Solvents such as benzol, aniline and carbon bisulphide, which would ordinarily coagulate latex if added directly, may be emulsified first and then added with safety. In cases where it is undesirable to have the solvent present in the latex, it is possible, if a proper emulsion has been made, to distill out the volatile solvent before adding to the latex, leaving behind the non-volatile material in an extremely finely divided state.

Other materials suggest themselves by analogy and their use either as a filler for rubber or the latex rubber

may so modify their own properties as to render them valuable in the arts. Thus starch can be readily mixed with latex, either directly or after boiling or after alkaline hydrolysis. A marked increase in water resistance can be noticed, both in the case of starch sizing and in hydrolyzed starch glue.

Viscose is miscible with latex in all proportions, although the best results are obtained by first removing as much of the ammonia as possible from the latex. Its use increases the water resistance of the film and renders it more elastic.

The possibility of the use of latex in connection with paper pulp has been shown by Kaye, but the possibility of incorporating beaten pulp as a compound of a rubber mix has not been emphasized. Thus by stirring in larger percentages of latex the rubber becomes a component rather than a beater size. Where bulk is required and the extreme tensile strength of fiber can be dispensed with, wood flour may be used. Wool shoddy and other animal fibers readily mix with latex and have a high affinity for the rubber therein.

Vulcanization

In passing from latex to vulcanized rubber there are two possible courses. First, the rubber in the latex may be vulcanized without breaking the colloidal state and this may be then worked up very much as with unvulcanized latex. This process was recently discovered by Schidrowitz. Secondly, sulphur, preferably colloidal, and a suitable catalyst can be mixed with the latex and brought down with the rubber, by whatever means is employed, and vulcanization be made the final step in the process.

Pre-Vulcanization. Complete details of this process can be found in Schidrowitz's U. S. patent 1,443,149. In general this process consists in heating an alkaline latex in an autoclave with sulphur and a catalyst to a temperature of about 140 deg. C.

In our experiments with this reaction we have found that a limited amount of vulcanization can be obtained very easily in this way. In fact we found that slightly ammoniacal latex containing ordinary melted sulphur and no catalyst, aside from the proteins naturally present, vulcanized about as readily as latex containing sulphur dissolved as polysulphides, or colloidal sulphur, and a catalyst. This reaction should afford an ideal method of studying the mechanism of vulcanization, with a view to obtaining definite proof as to whether sulphur actually combines with rubber or merely catalyzes a further polymerization. With this in view, we made the following experiment: A sample of latex was placed in a soda water bottle and sulphur (3 per cent on a rubber basis) was added. The whole was tightly stoppered and heated without shaking to 140 deg. C. for half an hour. The latex was then poured away from the sulphur, which separated as a cake on the bottom of the flask, and filtered through filter paper to remove any suspended sulphur. It was then highly diluted with distilled water and very carefully acidified with c.p. acetic acid to give the slowest possible coagulation. The coagulum was washed with dilute ammonia (c.p.) rolled into a thin sheet, pressed under a hydraulic press and thoroughly dried. On analysis the rubber was found to contain 0.48 per cent sulphur.

Of course, one experiment cannot be conclusive, but this certainly indicates an actual combination of the sulphur with the rubber. It is extremely unlikely that the protein or resin present could combine with this quantity of sulphur. The only other possibility would appear to be that the latex has a peptizing effect on sulphur and actually disperses it. Under the microscope, the particles of vulcanized latex are seen to be quite different from those of the original latex. The pear-shaped form is much less marked and the tails are gone. The sample analyzed and examined under the microscope was rather undervulcanized, as it still showed some tack with benzol.

It was our experience that higher degrees of vulcanization are difficult to obtain with latex without excessive coagulation. Also, with higher degrees of vulcanization the rubber does not adhere together well on coagulation.

With a rather undervulcanized latex such as we were able readily to obtain, the course of coagulation is entirely parallel to that of latex itself. Probably owing to the hydrolysis of proteins, as thick a mass cannot be obtained on partial coagulation of vulcanized latex as with the unvulcanized, but the grouping of the particles and the general behavior are the same with both.

After-Vulcanization. Following the usual procedure sulphur, either finely ground or colloidal, may be mixed in the latex, together with a dispersed catalyst. This mixture may then be used as the latex itself would be used, and following the removal of the water, the product may be subjected to the ordinary treatment to bring about vulcanization.

Liquid Oxygen Explosives

A liquid-oxygen explosive as made today consists of a permeable organic container, filler with the absorbent material, which is soaked in liquid oxygen immediately before use, state C. A. Taylor and W. H. Rinkenbach, assistant explosives chemists of the Department of the Interior, in Bulletin 219, recently issued by the Bureau of Mines. This cartridge is inserted in the borehole and exploded either by an electric detonator or by a special safety fuse and cap.

An inactive absorbing material, such as infusorial earth or aluminum oxide, is sometimes added. The proportions of the various ingredients of the cartridge should be such that they will absorb sufficient or more than sufficient liquid oxygen completely to oxidize the combustible matter present. Infusorial earth is unaffected, but is supposed to assist in the propagation of the explosive wave.

The cartridge is usually a tube of paper toweling, which serves as an insulator and as a combustible. A permeable envelope of a material such as cheese cloth is so constructed that it will fit into the insulator. This envelope holds the absorbent and combustible materials and also serves as a combustible. The material within the envelope may be classified as (1) absorptive and (2) combustible.

The absorbents that do not take part in the chemical action are usually infusorial earth and aluminum oxide, although the latter has not been used much. The combustibles sometimes serve also as absorbents, as was originally intended. Wood pulp, cotton, lampblack, coal dust, wood charcoal and cork charcoal serve a double purpose, whereas crude oil, paraffin, other liquid hydrocarbons and naphthalene are combustibles only.

Benzol as a Motor Fuel

Some Comparative Engine Tests With Crude, Acid-Refined and Silica-Gel Refined Motor Benzol

By A. C. Fieldner and G. W. Jones
Pittsburgh Experiment Station, U. S. Bureau of Mines

THE use of light oil as a motor fuel is of importance in districts adjacent to byproduct coking operations from which a reasonable proportion of the local demand may be supplied. Furthermore, the certainty of diminution of petroleum resources in the relatively near future demands the utmost utilization of gasoline substitutes from the distillation of coal, as well as from other sources.

In ordinary coking practice from 1½ to 3 gal. of refined motor benzol is obtained per ton of coal carbonized. The crude benzol is yellow in color, and contains sulphur compounds which corrode copper and brass; it also contains unsaturated bodies which oxidize and polymerize on standing, producing sediment and forming gummy deposits. These along with the other impurities are highly objectionable when the benzol is used in motors and therefore must be removed by further refining and distillation.

How the Fuels Were Tested

In order to investigate the practical utility of these fuels the Bureau of Mines, in co-operation with the Davison Chemical Co., made engine tests on motor-benzol fuels refined by various methods. The testing equipment consisted of a four-cylinder, 1915 model, Lycoming engine, with cylinders of 3½-in. bore and 5-in. stroke. The engine was directly connected to a Sprague electric dynamometer and revolution counter, from which the brake load and horsepower developed could be obtained. A Shebler carburetor, Titan a.c. spark plugs and a Connecticut battery-ignition system were used. The speed of the engine was kept constant and an orifice plate inserted between the carburetor and intake manifold gave a non-varying throttle adjustment so that the amount of fuel-air mixture entering the engine would be approximately constant. The fuel was supplied from a large graduated tank, and a record was kept of the weight of fuel consumed during each test. The air-fuel ratio (10.1 to 1 and 13.5 to 1) was calculated from an ultimate analysis of the fuel and the analysis of the exhaust gas. The testing period was set at 40 hours at an engine speed of 100 r.p.m. The temperature of the cooling water flowing through the engine was kept at 150 deg. F. (±1 deg.). All readings were taken every 15 minutes, and samples of exhaust gas every hour. At the end of a run, the quantity of fuel consumed was measured; then the carbon was removed from the cylinder head, cylinder block, spark plugs, and piston head, and was weighed. The so-called gummy deposits, when present, were found to collect under the intake valves, on the stems and in the intake manifold, close to where the gas mixture entered the combustion chamber. After each test these deposits were removed and weighed.

Performance of Different Fuels

Crude Benzol. The crude motor benzol used was a totally unrefined light oil direct from the wash-oil still of a large coke oven plant of the Koppers type. That portion boiling below 150 deg. C. was taken for the test. The run with this oil at a 10.1 to 1 air-fuel ratio showed that engine trouble was confined to gummy deposits sticking in certain of the intake valves while the engine was stopped and became cold over night. At the end of the run, heavy gummy deposits were found in the intake manifold and under the intake valves. The deposits were hard and brittle and had little odor. With the 13.5 to 1 air-fuel ratio, considerable gummy deposits were noted in the intake manifold and under the inlet valves after a 16-hour run.

It was concluded that crude motor benzol can not be used satisfactorily in an internal combustion engine until after certain compounds which form these gummy deposits are removed. These deposits, after a variable period of operation, prevent the valves from seating and cause the gases to pop back into the carburetor, and eventually stop the engine.

Acid-Refined Benzol. The acid-refined motor benzol used was a crude light oil that had been washed with (1) sulphuric acid, (2) caustic soda solution and (3) water, and then redistilled up to a temperature of 130 to 140 deg. C. With air-fuel ratios of 10 to 1 and 13.4 to 1, the engine ran satisfactorily throughout the full 40-hour test, without any valve trouble. A very thin gummy deposit was found in the intake manifold on two valve-stems, but the quantity was to small to weigh.

Gel-Refined Benzol. The crude benzol subjected to silica-gel refining was prepared from a new lot of crude light oil, which was distilled up to 143 deg. C. This distillate was vigorously agitated with 0.25 per cent of caustic soda in an equal weight of water. After ½ or 1 hour of settling, the alkaline solution was carefully separated, and the benzol subjected to percolation through silica gel. This material had been finely ground, all passing through 150 mesh, and was freshly activated before being used.

With the silica-gel treated motor benzol and an air-fuel ratio of 10.4 to 1, no valve trouble developed during the 40-hour run. A very small deposit was found in the intake manifold, and a slight sooty deposit on the underside of the inlet-valve heads. The valve-stems were exceptionally clean—in fact, the inlet-valves and intake manifold were cleaner than in any previous test.

Conclusions

1. Crude motor benzol can not be used satisfactorily in an internal combustion engine.

2. Acid-refined or silica-gel refined benzols develop no engine troubles and are satisfactory to use therein, providing the refining process in either case is complete in removing the gum-forming constituents.

3. Variation in the air-fuel ratio in these tests showed no definite influence on the quantity of gummy deposits formed.

4. A motor-benzol fuel which gives an evaporation residue less than 0.01 per cent by weight should not give gummy depositions in the intake manifold and on the intake valves, when used in an internal combustion engine.

This synopsis of a monthly report of investigation is published by permission of the Director, Bureau of Mines.

New Bulletin on Arsenicals

A study of chemical, physical and insecticidal properties of arsenicals on the market was undertaken by the U. S. Department of Agriculture in order to gain a better understanding of them, to be able, if possible, to improve them, and to produce new arsenicals for insecticidal purposes. The results of this investigation are set forth in Department Bulletin 1147.

Absorption

The Article Published Below Is an Advance in the Technology of This Unit Process and as Such Is of Significant Interest to Production Men in the Chemical Engineering Industries

Gasoline From Natural Gas

The Technique of Absorbing Gasoline From Natural Gas by Means of Solid Absorbents Is Both Dramatic and Commercially Practicable

By George A. Burrell
Consulting Chemical Engineer, Pittsburgh, Pa.

THE commercial use of solid adsorbents for extracting gasoline from natural gas, benzol from coal gas, for recovering volatile solvents and for various other uses dates from the close of the World War. At least this is true as regards their use on an appreciable commercial scale. During the war these adsorbents, especially activated charcoal, silica gel and a few others, were developed to high efficiency for adsorbing poison gases in gas masks. Activated charcoal especially was the material par excellence. in that no other adsorbent protected the soldier so effectively against such a wide variety of war gases.

Charcoal, as it is used today in commercial extraction work, is entirely made from coconut shells. Although a great many materials were experimented with during the war to develop other sources of raw material, none was found that produced an activated charcoal equal to coconut shells or other shell materials. At least this was true in the case of materials to be had in abundant quantities and prepared by processes not too expensive and tedious. To be sure, some fairly good substitutes were found that could be used in case of emergency. One of the most promising adsorbents developed was silica gel. Since the war the Davison Chemical Co. has adapted it to commercial work in refining gasoline and kerosene, in removing water from air and to refrigeration purposes, as well as to purposes for which activated charcoal is used. A substance of some promise is iron gel, although it is too early to define its particular advantage.

At the present time there are thirteen plants using activated charcoal to extract gasoline from natural gas. One plant has been erected to adsorb noxious gases given off by a large industrial plant. (See *Chem. & Met.*, pp. 1114-6, June 25, 1923.) This is a relatively new use of the material and one that is bound to grow. Several plants have been installed to recover volatile solvents. The material is used to purify helium gas as made in the Texas helium plant of the United States Government. No plants have yet been installed in this country to extract benzol and toluol from coal gas, although there are apparently several such plants in successful operation in Germany. The author has used activated charcoal as a catalyst in a large-scale operation and its usefulness along this line appears to be considerable. During the war it was used in all phosgene plants to promote the reaction between chlorine and carbon monoxide. It is now used extensively in gas masks for commercial purposes.

Activated charcoal, as it is used in the natural-gas gasoline industry, is placed in three adsorbers. It is of 8 to 14 mesh size, and is simply dumped into these adsorbers on screens of such mesh as to hold the charcoal but allow free passage of the gas.

System of Operation

One adsorber is always adsorbing, one distilling and one cooling. Natural gas is passed through one bed of charcoal until the latter has adsorbed its quota of gasoline. Charcoal will retain about 10 to 20 per cent of its weight of gasoline before some of the latter begins to escape. Next the gas flow is diverted by means of appropriate valves to another adsorber and saturated steam is forced into the first charcoal bed, driving out the gasoline. The gasoline vapor and steam are condensed in water-cooled condensers and the water trapped from the gasoline. Residual gas, which had its gasoline removed, is next passed through the charcoal bed, which has been previously treated with steam, in order to cool the charcoal and make it ready for a subsequent adsorption.

FIG. 1—EXTERIOR OF A CHARCOAL ADSORPTION PLANT FOR NATURAL-GAS GASOLINE

The exact mechanism of the adsorption of gases by charcoal is not well understood. R. E. Wilson (*Phys. Rev.*, U. S., vol. 16, 1920, p. 8) assumes that three separate phenomena take place: (1) The formation of a layer of adsorbed gas, one molecule deep, on the surface of the pores. (2) The formation of another layer of varying depth held by the attraction of the solid and the vapor. (3) Absorption due to capillary attraction. These three effects are accumulative. The first one occurs when the partial pressure of the vapor in the gas mixture is practically zero. The second one takes place when the first condition is satisfied. The third one is due to capillary condensation and occurs when the second layer is full. The rate of adsorption depends entirely upon the difference in vapor pressure of the adsorbed vapor in the capillaries of the charcoal and the partial pressure of the vapor in the gas. At first when this differential is very great the rate of adsorption is rapid. Later it slows up until finally the solid becomes saturated with vapor and the pressure of the latter is the same as the pressure of the vapor in the gas. Then absorption ceases.

Natural gas is essentially a mixture of paraffine hydrocarbons, the first of which, methane, is the least readily adsorbed by charcoal. It is present in largest quantity in so-called "dry" natural gas and in most "wet" gas. The next member, ethane, is more readily adsorbed than methane, propane more readily than ethane, and so on. When natural gas, from which the gasoline is to be extracted, first comes in contact with charcoal, part of it is absorbed.

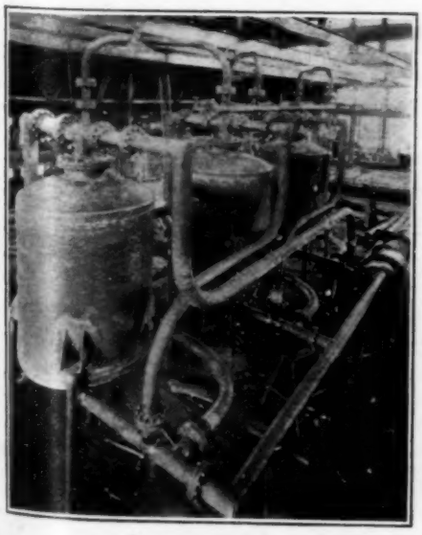


FIG. 2—ADSORBERS AND MANIFOLDS

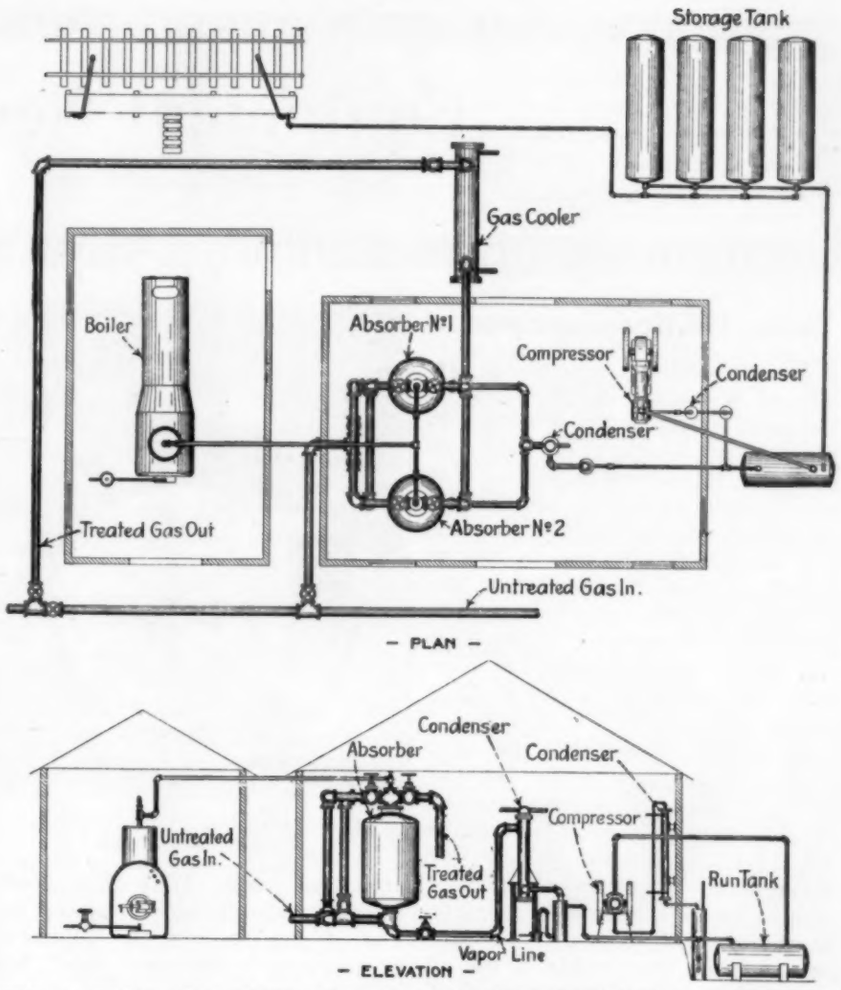


FIG. 3—PLAN AND ELEVATION OF GASOLINE EXTRACTION PLANT USING CHARCOAL ADSORPTION PROCESS. (NOTE: THIRD ABSORBER NOT SHOWN)

Although the gasoline constituents are more readily adsorbed there are not enough of them present to satisfy the adsorbing power of the charcoal and some of the other constituents are also adsorbed. As the natural gas advances through the charcoal bed to the outlet side of the adsorber, all of the charcoal is first saturated in this manner. More and more natural gas keeps coming in, however, and more of the gasoline constituents are adsorbed. As they are adsorbed they displace the lighter and undesirable constituents of the natural gas until finally all of the gasoline constituents which can be retained are condensed within the pores of the charcoal; the latter is saturated and the natural gas turned into a fresh adsorber, where the process is repeated.

This process of the gasoline constituents displacing the lighter ones is called selective adsorption. The charcoal selects and adsorbs the former more readily than it does the latter and that is why the gasoline from natural gas contains less of the more volatile (wild) constituents than gasoline produced by other processes.

After the charcoal has been saturated with gasoline vapor it is ready for the distillation process. Steam is turned into the adsorber in direct contact with the charcoal. The steam at a temperature of about 215 deg. F. simply heats the charcoal until most of the gasoline is removed. Not all of the gasoline is removed. A temperature of at least 300 deg. C. is required for this. At the end of the distillation period the charcoal will contain some gasoline and water vapor, and is cooled with residual gas from a fresh absorber. This residual gas removes most of the water and some of the residual gasoline. The charcoal, therefore, has not quite the same adsorption capacity for gasoline in all subsequent adsorptions. An additional quantity of charcoal is, therefore, required over that which would be used if all of the gasoline were expelled during each distillation, but this last would be too expensive.

Machinery and Appliances for Production and Control

Equipment News

From Maker and User

Materials and Accessories for Chemical Industries

Morse Oil-Burning System

The mechanical oil-burning system, of which the Morse system is the latest example, was developed in the attempt to apply oil fuel successfully to marine practice. The steam-atomizing system and the air-atomizing system for many reasons are not adapted to use in marine boilers. Therefore the various mechanical systems have received much attention. The system here described will prove as interesting to industrial users as it is to the shipping interests.

Up to the present time, in many mechanical systems, air for combustion is supplied around the outside of the hollow cone of oil, as shown in Fig. 1, the air and the oil traveling through the combustion chamber parallel to each other. It is plain, therefore, that combustion takes place only on the outside of the oil cone. The width of this cone of oil and the fineness of the atomization are very important in their relation to the time required for complete combustion to take place. It is also very important to consider the furnace volume that is required to burn a given quantity of oil per hour.

It will readily be seen that perfect combustion can be produced only by complete atomization of the oil into its finest atoms, each being far enough apart from its neighbor to permit being surrounded by the right amount of oxygen, and thus be burned completely in the shortest time and space. With this accomplished, more oil can be burned per unit of time per cubic foot volume of furnace, with the least draft and with no smoke.

FIG. 3—MORSE OIL BURNER—DAMPERS CLOSED

It is essential in the design of a mechanical oil-burning system that the control of admitted air, both around the periphery of the register and through its center, be so simple and easy of operation that it will be used. It is also necessary that the atomizer or burner should be of such design that the control of the amount of oil sprayed be simple, wide of range, and that the oil pressure remain constant.

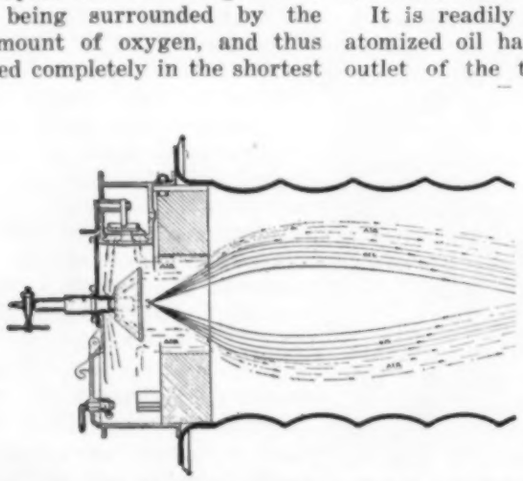
It is readily seen that after the atomized oil has emerged from the outlet of the tangential ducts, its velocity must be maintained at maximum. High velocity at this point determines the fineness of atomization when the oil is sprayed into the furnace chamber. Fineness of atomization is a primary requirement for perfect combustion.

The Morse system has been designed not only to utilize, for the first time, correct principles of atomization and air admixture, but to eliminate the various operating objections and complications now existing. (See Fig. 2.)

The outside appearance of the Morse burner is similar to that of other burners, with the exception that it is heavier and has an oil-control handle at the rear end. A spindle passes from this handle through the center of the barrel, and connects with a sleeve, which moves longitudinally along the outside of a nozzle. Tangential holes are drilled through this nozzle, and their outer ends connect with the whirling chamber of the tip.

A very important departure has been made in the design of tip and nozzle: the total area of the tangential ducts is smaller than that of the tip orifice. Thus no oil pressure develops in the whirling chamber of tip to retard the high velocity of the oil as it emerges in cone form. This results in a much wider angle cone being sprayed into the combustion chamber.

Of practically equal importance with the burner is the air register, or impeller. The Morse register con-



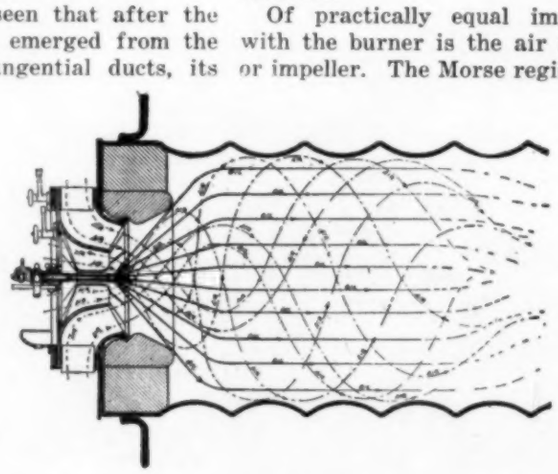


Fig. 1 (At left)—Diagrammatic illustration of many oil-burning systems. Note that the incoming air is in contact only with the outside surface of the hollow oil cone, causing combustion only at points of contact. Fig. 2 (At right)—Diagrammatic illustration of air admixture employed in Morse burner. Note how air stream cuts oil.

sists essentially of two venturi tubes, placed one within the other. Spiral vanes connect the two venturi tubes. On the inner side of the inner tube, other spiral vanes are placed. These vanes terminate about one inch from the axis of the burner to permit it to project into the furnace. The burner is attached to a special safety device which prevents its being taken out of the air register during operation. This removes a source of fire danger now existing, particularly when inexperienced firemen are on watch. The periphery of the register is equipped with explosion doors, or shutter vanes. These doors are closely controlled by a single lever on the register front. If, due

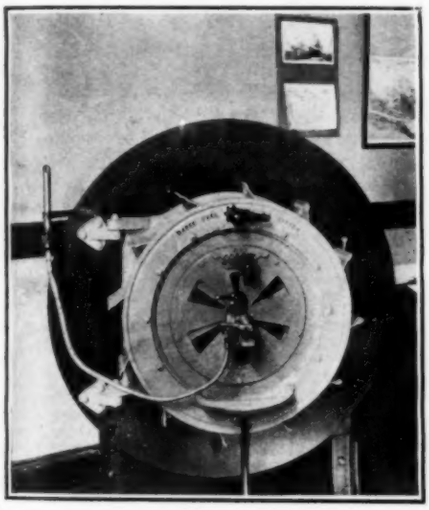


FIG. 4—MORSE OIL BURNER—DAMPERS OPEN

to some explosion of gases in the furnace, there is a backfire, these doors automatically close, shutting the flame from the boiler room and preventing injury to the operator. The inlet of the inner venturi tube is covered by a shutter which can be opened or closed at will to permit of air being admitted to the apex of the oil cone close up to the burner tip. If found necessary that no air be admitted to this zone, this shutter

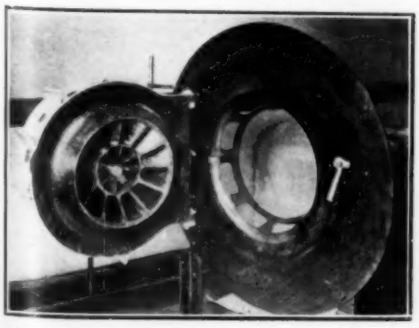


FIG. 5—MORSE OIL BURNER—COMBUSTION SIDE

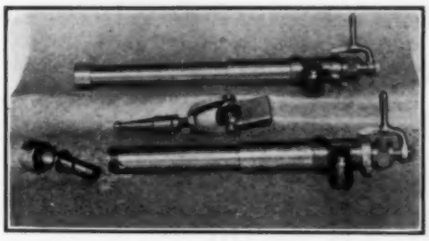


FIG. 6—MORSE OIL BURNER NOZZLE
Assembled and disassembled, showing control. Also cone-shaped oil hose connection with yoke and screw.

may be closed entirely, thus causing a slight vacuum. This will immediately increase the angle of the spray leaving the orifice outlet.

The Morse Drydock & Repair Co. which manufactures the Morse mechanical oil-burning system, claims that through the use of its burner, register, heater and strainer economies are produced which no engineer responsible for fuel-oil combustion can afford to ignore.

Improvement in Oil- or Fat-Expressing Equipment

The new friction quill drive, designed for the oil expellers manufactured by the V. D. Anderson Co., of Cleveland, Ohio, does away with the belt pulleys and weights necessary in the old system. The feeding of the material into the expeller is controlled by means of sixteen springs in the friction frame or drum.

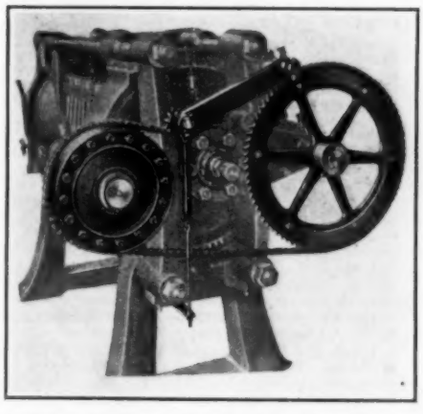


FIG. 1—THE ANDERSON QUILL DRIVE

Should the pressure in the expeller become so great that further feeding is impossible, the quill-feeding worm stops and the friction disks slip in their housing. This action is only momentary, or just long enough to allow the expeller to free itself, whereupon regular operation is resumed. The new drive can be set, at the option of the operator, to exert any desirable pressure. It is fitted with a sheet-metal housing, convenient openings being provided to permit lubrication and to facilitate adjustment.

Another improvement in the Anderson expeller is seen in the new rotary screen and pump, which obviates the necessity for the elevator and strainer previously used. Underneath the oil pan beneath the expeller a motor- or belt-driven pump is provided, which lifts the oil up and forces it through a rotary screen, mounted on top of the tempering apparatus. This screen revolves slowly, removing the fine "foots" from the oil and discharging them into the tempering apparatus, where they are mixed with the new material going into the pressing cylinder of the expeller.

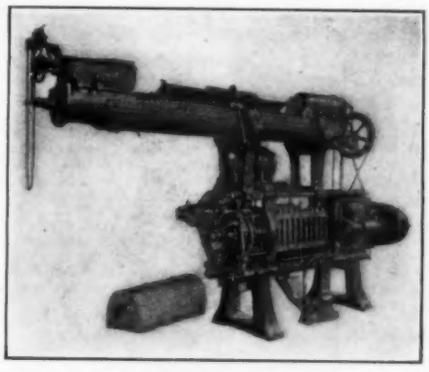


FIG. 2—THE ANDERSON SIDE DRIVE OIL EXPELLER
With quill drive, tempering apparatus, screw type feed, rotary oil strainer and pump.

The equipment has been found to be a distinct boon to the small oil producer, who does no refining, as well as to the large-scale operator. The reduction in the amount of foots in the oil minimizes the formation of free fatty acid where no refining is practiced. Where it is, the adoption of the new rotary screen equipment permits an extension of the time between the opening of filter presses used for clarification, and consequent economy of operation.

These improvements have been designed so that they can be installed on the Anderson expellers now in operation.

Catalogs Received

DEARBORN CHEMICAL CO., Chicago, Ill.—A new catalog entitled "Lubrication From Dearborn Oil."

MORSE DRY DOCK & REPAIR CO., New York City—Two new catalogs entitled "The Morse Fuel Oil Burning System" and "Maximum Results From Fuel Oil." These two catalogs are descriptive of the Morse mechanical system of fuel oil burning.

STEERE ENGINEERING CO., Detroit Mich.—Pamphlet 253. A pamphlet describing the steel purifier boxes manufactured by this company.

Review of Recent Patents

Electrolysis of Cerium Chloride to Produce Misch Metal

A New Method of Production Which Effects Economies in Crucible Consumption and Operation

IN THE production of misch metal, an alloy composed principally of cerium and certain other rare metals in combination with a small amount of iron, it has been the custom to electrolyze impure cerium chloride in cast-iron pots or crucibles. In carrying out this process a graphite or carbon electrode is used as the anode of the furnace, and has its lower end projecting into the cast-iron pot or crucible. The crucible acts as the cathode of the furnace. During the operation of a furnace of this type the misch metal collects in the bottom of the crucible and the fused salt floats on top of the misch metal, thereby excluding the atmosphere from the misch metal and effectively preventing its oxidation. After a furnace constructed in this manner has been operated for some time, it is necessary to remove the misch metal from the crucible to prevent it from contacting with the carbon or graphite electrode, and thus short-circuiting the source of electric current. By reason of the fact that the misch metal at the temperature at which it is formed in the furnace is highly flammable, it has heretofore been the custom to remove the cast-iron crucible with its content of misch metal covered by molten salt, and allow it to cool. After the misch metal has solidified and cooled below its ignition point, it is necessary to break up the crucible in order to secure the misch metal. This method of removing the misch metal from the crucible is objectionable, first, by reason of the fact that it is expensive, as it entails the destruction of the crucible, and second, be-

American Patents Issued Aug. 28, and Sept. 4, 1923

The following numbers have been selected from the latest available issue of the *Official Gazette* of the United States Patent Office because they appear to have pertinent interest for *Chem. & Met.* readers. They will be studied later by *Chem. & Met's* staff, and those which, in our judgment, are most worthy will be published in abstract. It is recognized that we cannot always anticipate our readers' interests and accordingly this advance list is published for the benefit of those who may not care to await our judgment and synopsis.

1,465,927—Hardness-Testing Device. R. Baumann, Stuttgart, Germany.

1,465,937—Process for the Production of Homogeneous Wood Material and the Product Thereof. V. H. Forssmann, Cologne, Germany.

1,465,954—Process of Producing Carbon Dioxide. H. E. Sturcke, Brooklyn, N. Y., assignor to General Carbonic Co., New York.

1,465,955—Apparatus for Treating Liquids. H. E. Sturcke, Brooklyn, N. Y., assignor to General Carbonic Co., New York.

1,466,053—Combined Water Softener and Storage Tank. C. Ladd, Chicago, and T. G. Windes, Jr., Winnetka, Ill., assignors to Chicago Bridge & Iron Co.

1,466,064—Coke-Oven Door and the Like. A. Roberts, Evanston, Ill., assignor, by mesne assignments, to Chicago Trust Co.

1,466,208—Rotating Electrode Closed Treater for Petroleum Emulsions. H. C. Eddy, Los Angeles, Calif., assignor to Petroleum Rectifying Co. of California, San Francisco, Calif.

1,466,213—Surfacing Material for Refractory Ware. P. Teetor, Lawrence, Kan., assignor to Jeffery-Dewitt Co., Detroit, Mich.

1,466,215—System of Coking. G. W. Traer and C. M. Garland, Chicago, Ill., assignors to Universal Coal Products Co., Chicago, Ill.

1,466,221—Continuous Distilling Apparatus. J. P. Foster and A. F. Misener, Paia, Territory of Hawaii.

1,466,301—Process for Producing Steel. J. T. Jones, Pittsburgh, Pa., assignor to Howells Metallurgical Co., Pittsburgh, Pa.

1,466,329—Process of Acetylizing Cellulose. H. P. Bassett, Cynthiana, Ky.

1,466,348—Overflow Drain and Water Seal for Gas Washers. K. Weinel, Chicago, Ill., assignor to Freyn, Brassert & Co., Chicago, Ill.

1,466,353—Recovering Alkali-Metal Salts From Brines. C. E. Dolbear, San Francisco, Calif., assignor to Industrial Research Co., San Francisco.

1,466,356—Method of and Apparatus for Mixing and Proportioning Gases. W. B. Eddison, Irvington, N. Y., assignor to Surface Combustion Co., New York.

1,466,357—Concentrating Evaporator. G. Engel, Sr., Brooklyn, N. Y., assignor to Buffalo Foundry & Machine Co., Buffalo, N. Y.

1,466,377—Method and Apparatus for Separating Coke and Ash. P. H. Jung, Mount Union, Pa.

1,466,401—Process of Making Cellulose Acetate. J. M. Kessler, West Orange, and V. B. Sease, Newark, N. J., assignors to E. I. du Pont de Nemours & Co., Wilmington, Del.

1,466,411—Distillation Apparatus. W. A. Peters, Jr., Wilmington, Del., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.

1,466,435—Process of Dehydrating Organic Liquids. J. A. S. Hammond, Woodlaw, Md., assignor to U. S. Industrial Alcohol Co.

1,466,477—Cooling Tower for Dry Cooling of Hot Coke. A. Moetteli, Oberwinterthur, Switzerland.

1,466,499—Pulp Bleacher. Philip K. Fletcher, Alpena, Mich.

1,466,535—Manufacture of Triaryl Guanidines. L. P. Kyrides, Buffalo, N. Y., assignor to National Aniline & Chemical Co., New York.

1,466,571—Process for Agglomerating Pulverous Materials. C. T. Thorssell and O. Troell, Gottenborg, Sweden, assignors to Aktiebolaget Kvafveindustri, Gottenborg, Sweden.

1,466,579—Method of and Apparatus for Treating Fluids. H. F. Collver, Simcoe, Ont., Canada, assignor, by mesne assignments, to E. S. Wertz, Cleveland, Ohio.

1,466,604—Process for Obtaining Nitric Oxide. T. E. Springmann, Charlottenburg, near Berlin, Germany.

1,466,619—Production of Hydrogen. A. R. Griggs, Bromley, England.

1,466,624-5—Nitrogen Fixation. K. P. McElroy, Washington, D. C., assignor to Ferro Chemicals Inc., Washington, D. C.

1,466,626-8—Process of Making Cyanides. K. P. McElroy, Washington, D. C., assignor to Ferro Chemicals Inc., Washington, D. C.

1,466,638—Mixing Apparatus. E. A. Browne, Wayne, Pa., assignor to Barber Asphalt Co., Philadelphia, Pa.

1,466,663—Coke Oven. E. Lecocq, Brussels, Belgium.

1,466,665—Process of Making Glycerin. K. P. McElroy, Washington, D. C., assignor, by mesne assignments, to Carbide & Carbon Chemicals Corporation.

1,466,670—Process for Concentrating Solutions and Evaporating Fluids. E. Monti, Turin, Italy.

1,466,683—Process of Manufacture of Diphenylene Diketones as Anthraquinone or Its Derivatives. A. Ullrich, Frankfort-on-the-Main, Germany.

1,466,775—Reversing Valve for Open-Hearth and Other Types of Regenerative Furnaces. W. H. Wharton, Toronto, Ont., Canada.

1,466,793—Process for Separating and Recovering Iron and Zinc From Sulphide Ores. F. A. Eustis, Milton, and D. Belcher, Boston, Mass., assignors of one-half to said Eustis and one-half to C. P. Perin, New York.

1,466,819—Manufacture of Plastic Masses. H. Dreyfus, London, England.

1,466,991—Process for Making Phenol. P. Cottringer, Midland, Mich., assignor to Dow Chemical Co., Midland, Mich.

1,467,003—Electrical Dehydrator. R. E. Land, Houston, Tex., assignor to Petroleum Rectifying Co.

1,467,038—Drier. A. G. Huhn, Minneapolis, Minn., assignor to A. Huhn Manufacturing Co., Minneapolis, Minn.

1,467,074—Method of Purifying Acetic Anhydride. C. J. Strosacker and C. C. Schwegler, Midland, Mich., assignors to Dow Chemical Co., Midland, Mich.

1,467,080—Electrical Apparatus for Producing and Collecting Gases. J. M. Allen, St. Louis, Mo., assignor of one-half to G. Mertens, St. Louis, Mo.

1,467,081—Process for Producing Stable Emulsions of Edible Oils. E. E. Ayres, Jr., Chester, Pa., assignor to Sharples Specialty Co., Philadelphia, Pa.

1,467,091-1,467,105—Cellulose-Ether Solvent and Composition. S. J. Carroll, Rochester, N. Y., assignor to Eastman Kodak Co., Rochester.

1,467,107—Process of Making Alkali Cellulose. E. S. Farrow, Jr., Rochester, N. Y., assignor to Eastman Kodak Co., Rochester.

1,467,189—Crusher. O. J. Moussette, Richmond Hill, N. Y.

1,467,193—Manufacture of Ammonium Sulphate. P. Parrish, London, England, assignor to himself and South Metropolitan Gas Co., London, England.

1,467,201.—Hydraulic Press. H. T. Shriver, Llewellyn Park, N. J.

1,467,217—Electrolytic Cell. J. M. Williams, Henryetta, Okla.

1,467,222—Method and Means for Incorporating an Anti-Knock Substance With a Motor-Fuel Mixture. F. E. Aseltine, Dayton, Ohio, assignor to General Motors Research Corp., Dayton, Ohio.

1,467,258—Process of Manufacture of Diphenylene Diketones as Anthraquinone or Its Derivatives. A. Ullrich, Frankfort-on-the Main, Germany.

1,467,265—Process of Regenerating Cellulose. A. D. Conley and E. C. Stillwell, Baltimore, Md., assignors, by mesne assignments, to J. P. Hooper Mfg. Co., Baltimore.

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

cause the misch metal that is in contact with the salt is mixed with more or less of the salt.

Another objection to this method of removing the misch metal from the crucible arises from the fact that it is desirable to operate a plurality of the furnaces in which the misch metal is made, and to connect these furnaces in series with a suitable source of current.

Where it is necessary to remove the crucible bodily in order to remove the misch metal formed therein, the circuit supplying the current to the plurality of furnaces must first be opened and held open until a new crucible can be substituted for the one removed, and filled with the salt and started into operation. This requires time, and during this time the remaining crucibles are cooling off more or less, and the operation of all of the furnaces is thus interfered with. It has been found desirable to keep the furnaces at a constant temperature, and this cannot be easily accomplished where it is necessary to remove the crucibles each time they are to be replaced by other crucibles.

With the object of overcoming these difficulties, Clarence W. Balke, of Highland Park, Ill., has modified the procedure so that the misch metal can be removed from the crucible without interrupting the electrolysis. The crucibles are set on brick piers and are surrounded with a sheet metal casing of such size as to leave a space between the walls of the crucible and the casing.

During the normal operations of the furnace, this air space permits rapid radiation of heat from the crucible so that it is maintained at the proper temperature, which for efficient results is such that the misch metal is only plastic and not molten. When sufficient metal has collected, the air space is filled with a powdered insulator such as Sil-O-Cel, thereby preventing radiation and causing the temperature to rise to the melting point of the misch metal. The molten metal is then removed by suction. A heated iron tube is inserted and the metal sucked through this into molds or other containers out of contact with the air. Near the end of the tube inserted there is a plug of misch metal which prevents any of the fused salt from entering the tube. The plug of course melts soon after the end of the tube reaches the molten metal. A simple but very ingenious device prevents metal from passing beyond the mold to the suction pump. In the first section of the pipe leading from the mold to the pumps, copper wires or shavings are packed. Should molten metal reach them, their high heat conductivity chills the metal so rapidly that it solidifies and stops the flow.

By means of the apparatus and method just described, the molten misch metal can be removed without destroying the crucible, and without in any way affecting the operation of the remaining furnaces.

An additional advantage is that the misch metal is not exposed to atmosphere and is not oxidized. There is, of course, a slight amount of air in the mold which will oxidize the first portion of misch metal passing into the mold, but this amount is so small as to be entirely negligible. (1,464,862; assigned to Fansteel Products Co., North Chicago, Ill.; issued Aug. 14, 1923.)

Important Articles in Current Literature

More than fifty industrial, technical or scientific periodicals and trade papers are reviewed regularly by the staff of *Chem. & Met.* The articles listed below have been selected from these publications because they represent the most conspicuous themes in contemporary literature, and consequently should be of considerable interest to our readers. A brief résumé of each article is included in the reference given. Since it is frequently impossible to prepare a satisfactory abstract of an article, this list will enable our readers to keep abreast of current literature and direct their reading to advantage. The magazines reviewed have all been received within a fortnight of our publication date.

CHEMISTRY IN THE ELECTRICAL INDUSTRY. Alan A. Drummond. In the construction of electrical machinery the principal chemical problems include manufacture of insulating varnishes, molding compositions, phenol-formaldehyde condensation products and selection of suitable metals and alloys. *Chem. & Ind.*, Aug. 10, 1923, pp. 769-70.

THE INFLUENCE OF BASES ON THE ACTIVITY OF VULCANIZATION ACCELERATORS. G. Stafford Whitby and A. Cambron. Also THE AUDITY OF RAW RUBBER (same authors). *J. Soc. Chem. Ind.*, Aug. 10, 1923, pp. 333T-339T

ACTION OF OZONE ON HYDROCARBONS, WITH SPECIAL REFERENCE TO THE PRODUCTION OF FORMALDEHYDE. E. W. Blair and T. S. Wheeler. Ethylene treated with ozone yields ethylene ozonide, which breaks down to form formaldehyde. The yield depends on the concentration of the O_3 in the mixed gas, the per cent of moisture present, etc. *Journ. Soc. Chem Ind.*, Aug. 24, 1923, pp. 347T-350T.

RESIN SIZING. A. E. Leicester. Resin size utilization is frequently superior to others because of cost and reliability. A study of the use of alum and the influence of beating. *Paper Trade Journal*, Sept. 6, 1923, pp. 49-51.

LA DISTILLATION DES LIGNITES. F. Colomer. Report of a discussion held at the twenty-sixth annual meeting of the Chambre Syndicale des Ingenieurs, in which the progress of lignite distillation in France is reviewed. *Le Génie Civil*, Aug. 25, 1923, pp. 181-3.

STAINLESS STEEL. Anon. A discussion of the various practical plant applications of this valuable engineering material. *Iron & Coal Trades Review*, Aug. 10, 1923, pp. 185-7.

THE STAINLESS METALS OF COMMERCE. J. Kent Smith. A paper on their properties and heat-treatment, showing large possibilities of iron-chrome complex, and discussing the place of non-ferrous alloys. *Iron Age*, Sept. 6, 1923, pp. 615, 630-1.

THE PROPOSED PROCESS FOR COMPLETE GASIFICATION OF COAL BY THE USE OF OXYGEN. L. J. Willien. A paper which gives a summary of available data on the gasification process using 90 per cent oxygen and steam in a gas producer. *American Gas Association Monthly*, September, 1923, pp. 565-70.

PURCHASING AGENT AND ENGINEER. W. E. Irish. A discussion of the facts which govern the relations between these two important factors in industry. *Bulletin* of the Taylor Society, August, 1923, pp. 150-160.

Book Reviews

THE FLOW OF GASES IN FURNACES, by *W. E. Groume-Grjimailo*, Professor of Iron Manufacturing at the Polytechnic Institute of Petrograd. Translated from Russian into French and from the French by A. D. Williams. With an appendix on "The Design of Open-Hearth Furnaces," by the American translator. New York: John Wiley & Sons, Inc.; 400 pages. Price, $5.50.

This book is at least half A. D. Williams', because of the very extensive appendix in which he applies the principles developed in the translated work, and of his graphic presentation of the problems of combustion. Some of the latter material was published serially in the *Iron Age*. Apparently he has achieved the difficult problem of applying abstract scientific principles to very complex industrial work, since I learn in conversation with one of the leading designing engineers that the flue and stack dimensions as designed on Mr. Williams' data are quite in accord with best practice. They also check the work of Mr. Bagley, the British writer who over a year ago presented considerable data on the design of open-hearth furnaces before the British Iron and Steel Institute.

It is difficult for the busy operator to know very much about the intimate details of furnace design, but it is unquestionably true that someone in his organization must have a good grasp of the thermal reactions throughout the whole furnace system from producer through to the stack, because errors of judgment and calculations caused by ignorance of such matters return to plague you every day.

Mr. Williams and Professor Trinks of Carnegie Institute of Technology are tearing away some of the mystery that obscures the theory of flame propagation and heat regeneration. Thanks to them, the view of many operators is going to be much clearer. The present reviewer may attach much more importance to the work of these men than do many other open-hearth men, but the leaven will work, however.

F L. TOY.

Obituary

ARTHUR E. RICE, president of the Pennsylvania Salt Manufacturing Co., Philadelphia, Pa., died on Aug. 26, at the Canyon Hotel, Yellowstone National Park, where he had gone for a vacation. He was born in Philadelphia in 1870 and had been connected with the company of which he was president since 1888, rising successively from bookkeeper to treasurer, vice-president and president, in which latter capacity he had acted since 1921, succeeding Joseph Moore, Jr. He is survived by two sons, two brothers and a sister.

Men in the Profession

RALPH H. ACKERMAN, who for nearly 2 years has been chief of the Latin-American division of the Bureau of Foreign and Domestic Commerce, has been appointed commercial attaché at Santiago, Chile.

ELLERY A. BAKER has been elected treasurer of the Dayton Rubber Manufacturing Co., Dayton, Ohio.

Dr. GEORGE FALES BAKER has been elected president pro tem. of the Pennsylvania Salt Manufacturing Co., Philadelphia, Pa., to fill the vacancy caused by the death of Arthur E. Rice, president. Dr. Baker has been a director of the Pennsylvania salt company for many years.

JOSEPH S. BATES, formerly manager of the research division of the Marcus Hook, Pa., plant of the National Aniline & Chemical Co., is now with the Textile Service Co., Philadelphia, Pa.

J. P. BONARDI, formerly manager of the assay and chemical department of the Mine & Smelter Supply Co., of Denver, Colo., has been promoted to sales manager of the New York office, with headquarters at 42 Broadway. Mr. Bonardi, before joining the Mine & Smelter Supply Co. in August, 1921, had been for a number of years a member of the staff of the U. S. Bureau of Mines, Rare and Precious Metals Station.

B. CHESTER BROWN, chief mining engineer for the California State Industrial Accident Commission, Sacramento, has resigned to become head of the division of mines and oil of the State Compensation Fund.

JOHN BRUNNER has been appointed manager of the recently created department of metallurgy and inspection of the Illinois Steel Co., Chicago. He has heretofore acted as assistant inspecting engineer for the company. F. S. CRANE has been appointed assistant manager of the new department.

THEODERE H. BURKE has become metallurgist and foundry superintendent for the Otis Elevator Co., at Buffalo, N. Y. He was formerly metallurgist for Isaac G. Johnson & Co., Spuyten Duyvil, N. Y., which recently disposed of its plant.

S. CAPLAN, formerly a research chemist associated with the Nucoa Butter Co. at Bayonne, N. J., has joined the research staff of the Combustion Utilities Corporation at Long Island City, N. Y.

HUGH CHISHOLM, president of the Nashwaak Pulp & Paper Co., Ltd., operating a pulp mill at St. John, N. B., and owning large tracts of pulpwood areas in central New Brunswick along the Nashwaak and Miramichi Rivers, is spending some time in Nova Scotia investigating pulp and paper conditions.

LOUIS R. DAVISON of Buffalo, N. Y., has been elected president of the Union Drawn Steel Co., Beaver Falls, Pa., to succeed Frederick N. Beegle, deceased. EUGENE HOOPER has been elected vice-president and general manager. EDWARD C. REBASKE, secretary and treasurer of the company, has been elected president of the Standard Gauge Steel Co. of the same city, an affiliated organization, succeeding Mr. Beegle. HERBERT MAY of Pittsburgh, Pa., has been elected vice-president of the last noted company.

ERNEST G. JARVIS, formerly chief chemist and metallurgist, McNab & Harlin Manufacturing Co., Paterson, N. J., is now vice-president and general manager of the Niagara Falls Smelting & Refining Corporation, Buffalo, N. Y.

Dr. GRINNELL JONES of the division of chemistry, Harvard University, has recently returned to Cambridge, Mass., from Washington, D. C., where since July 1 he has been assisting the Chemical Division of the U. S. Tariff Commission.

Calendar

AMERICAN ELECTROCHEMICAL SOCIETY, forty-fourth meeting, Dayton, Ohio, Sept. 27 to 29.

AMERICAN GAS ASSOCIATION, annual convention, Atlantic City, Oct. 15 to 20.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, winter meeting, Washington, D. C., Dec. 5 to 8.

AMERICAN MANAGEMENT ASSOCIATION, Hotel Astor, New York, Oct. 29-31.

AMERICAN MINING CONGRESS, Milwaukee, Wis., Sept. 24 to 27.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, annual meeting, New York City, Dec. 3 to 6.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, annual convention, New York City, Dec. 3 to 5.

AMERICAN SOCIETY FOR STEEL TREATING AND INTERNATIONAL STEEL EXPOSITION, Motor Square Garden, Pittsburgh, Pa., Oct. 8 to 13.

ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS, convention and exposition, Buffalo, N. Y., Sept. 24 to 28.

NATIONAL ASSOCIATION OF PRACTICAL REFRIGERATION ENGINEERS, fourteenth annual convention, Memphis, Tenn., Dec. 12 to 16.

NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES (NINTH), New York, Sept. 17 to 22.

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING, Grand Central Palace, New York, Dec. 3 to 8.

NATIONAL SAFETY COUNCIL, twelfth annual safety convention, Statler Hotel, Buffalo, Oct. 1 to 5.

SOCIETY OF AUTOMOTIVE ENGINEERS, annual meeting, simultaneously with the Detroit Automobile Show, General Motors Bldg., Detroit, Mich., Jan. 22 to 25, 1924.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Appleton, Wis., Oct. 25 to 27.

J. P. LANEY has been appointed executive secretary of the Midcontinent Oil and Gas Association, Dallas, Tex., succeeding Howard Bennette, resigned. He will be in direct charge of the Texas division of the organization.

OSCAR LEE of the U. S. Bureau of Mines has been transferred from Minneapolis to the Southern Experiment Station, Tuscaloosa, Ala., and placed in charge of iron ore beneficiation under the direction of Dr. W. R. Crane, superintendent of the station.

JOHN EDWARD MYERS of the Acme Rubber Manufacturing Co., Trenton, N. J., gave an interesting address, Aug. 23, before the members of the local Rotary Club on the history of crude rubber, with particular reference to the merits of South American Para rubber and the plantation product.

V. F. PARRY, formerly of the Pittsburgh station of the Bureau of Mines, is now a research chemist for the Combustion Utilities Corporation at Long Island City, N. Y.

N. A. V. PAULSSON, who has been in Brazil for Corning & Co., has returned to the home office and will continue to act as chief engineer. Mr. Paulsson is also doing special work for the Ludlum Steel Co.

Dr. IRA REMSEN, president emeritus of Johns Hopkins University, is to be awarded the Priestley medal for outstanding achievement in chemistry.

CLARENCE P. SALMON is now metallurgist with the Pittsburgh Metallurgical Co. of Niagara Falls, N Y.

Dr. EDGAR F. SMITH, former provost of the University of Pennsylvania, has been made an officer of the Legion of Honor of France. He received formal notification to this effect from the French Embassy at Washington. Dr. Smith was awarded the decoration, the embassy stated, in recognition of the part he took in the Pasteur celebration in America, his standing as a scientist and the friendly attitude he has always shown toward France.

JULIAN F. SMITH, formerly of Terre Haute, Ind., has moved to Akron, Ohio, where he will be employed in the research laboratory of the B. F. Goodrich Co.

WILLIAM SMITH, Canadian representative of several United Kingdom manufacturers of chinaware, glassware and pottery, returned to Toronto recently after an extended tour of the pottery district of England.

JOHN J. WATSON, JR., has been elected president of the International Agricultural Corporation, New York, succeeding Stephen B. Fleming, resigned.

R. E. WERTZ has been elected vice-president of the Producers' & Refiners' Corporation, with headquarters at Chicago, Ill.

Industry and Trade

Current News and Market Developments

Summary of the Week

Electrochemical Society's plans for Dayton meeting Sept. 27 to 29 are completed.

Large radium deposits reported in Turkestan.

War explosive to be used for blasting.

A thousand chemists and guests attend Milwaukee meeting of A.C.S., at which prize essay contests, scholarships and special prizes were announced.

Bleaching powder has sold at very low prices and there is no fixed market price.

Soap makers were heavy buyers of palm oil for future delivery.

Revised figures place amount of dyes seized in the Ruhr at 5,400 tons.

Tariff Commission holds public hearing on petition for higher duty for nitrite of soda.

Production of acetate of lime and methanol declined in July.

Dyes seized in the Ruhr by French and Belgians will be sold at high prices.

Government report indicates yield of 19,400,000 bu. flaxseed, according to conditions as of Sept. 1.

Producers have announced an advance of 2c. per gal. on all grades of denatured alcohol.

Nitrite of Soda Hearing Held Before Tariff Commission

Leading Domestic Producer Petitions for 50 Per Cent Increase in Duty—Production at Present Price Unprofitable

ONLY one witness appeared before the Tariff Commission at its public hearing Sept. 10 into the application under the flexible tariff for an increase of 50 per cent in the 3c. per pound duty on sodium nitrite. There was no disclosure at the public hearing of costs of production either from domestic plants or by foreign producers.

C. F. Graff, president and general manager of the American Nitrogen Products Co., of Seattle, Wash., which filed the application for an increase, was the sole witness. The application was opposed by the Norwegian Nitrogen Products Co., New York, which is the selling agency of producers in Norway. While the Norwegian company was represented by Judge Marion DeVries as counsel, it did not introduce any witnesses or offer evidence.

Mr. Graff testified that his company produces about half of the domestic output of sodium nitrite and that it has not been able to declare a dividend owing to foreign competition. He estimated the normal annual consumption of the United States at between 3,000 and 5,000 tons and asserted that the capacity of all the plants in the United States was sufficient to fully meet the domestic requirements.

The arc process is used by the American Nitrogen Products Co., Mr. Graff testified, this having been adopted as a result of widespread experiments by foreign governments which established this method as the most efficient. His company is producing sodium nitrite only at present, Mr. Graff said, but plans to expand its plant so as to produce nitrate at an early date, just as soon as market conditions for nitrate justify entering that field. Mr. Graff testified that the nitrite imported from Norway largely is a byproduct, in the view of the producers there whose principal output is nitrate for use as a fertilizer.

The American company has disposed of a nitrite plant which it formerly operated in British Columbia, Mr. Graff stated, being forced to this course because it could not operate the Canadian plant profitably and pay the tariff duty of the product into the United States, which offered practically the only market, and needing the tariff protection from its United States production as a defence against European output.

Although the market for nitrite is almost exclusively in the East, the bulk of the consumption being by manufacturers of coal-tar dyes, Mr. Graff testified that cheap water power in the Washington state location more than overcame the long transportation haul from the factory to market.

Having submitted to the Tariff Commission a full statement of costs of production, capitalization, investment and other business factors, Mr. Graff declined to discuss or to disclose these items at the public hearing, declaring that his data had been submitted to the commission in confidence and that he did not care to have them displayed before his competitors. Efforts were made during the examination to bring to light details of a stockholders' dissension in the American company, but much of this was ruled out.

Mr. Graff stated that at the present price of sodium nitrite it is not a profitable output and that until costs of production were lowered by producing nitrate also or by other means, it probably would be necessary to increase the price of nitrite by the 1½c. per pound additional duty which this company seeks to have imposed under the terms of the flexible tariff, but he asserted that as costs of production were lowered, the benefits would be passed on to consumers.

The Norwegian company gave no cost figures to the commission at the hearing and its counsel merely cross-examined Mr. Graff. The commission gave until Sept. 26 for filing briefs in the case and final argument was fixed for that date.

Under the Underwood act the duty on nitrite of soda was ½c. per lb. This was increased to 3c. per lb. by the provisions of the McCumber-Fordney act. With the establishment of a dye industry in this country, consumption of nitrite of soda increased and imports assumed larger proportions. In 1915 receipts of foreign-made nitrite were 1,696,567 lb. and in 1917 arrivals from foreign countries reached a total of 3,675,179 lb. Imports for the first 7 months of this year were as follows:

	Lb.	Value
January	662,787	$28,974
February	465,197	21,208
March	845,651	38,502
April	652,382	28,359
May	851,258	36,199
June	169,850	6,996
July	134,583	8,454
	3,781,708	$168,692

Thousand Attend Eventful Meeting of A.C.S. at Milwaukee

Surprising Announcements of Prizes, Fellowships and Scholarships —Opening Addresses Important—Council Decides on Regional Directorship

RETURNING after an absence of exactly 10 years, the American Chemical Society met in Milwaukee Sept. 10 to 14 for its sixty-sixth general meeting. A thousand chemists and their friends were on hand for the social and technical gatherings, which included an all-day excursion to the University of Wisconsin at Madison and visits to more than a score of the varied industries of the district. The general and divisional programs were held in the large municipal auditorium, which provided ample facilities.

Clare H. Hall, chairman of the local section, called the first general meeting to order on Tuesday morning. After commenting on the phenomenal growth during the past decade of both city and society, he introduced Mayor Daniel W. Hoan, who voiced the city's welcome to the society. He declared that the city of Milwaukee has a genuine appreciation of the value of chemistry. The city's chemical department has not only solved its difficult problems of water supply and sewage disposal but during the past year by the protection which it has afforded the city's milk and butter supply it has saved more than fifty times its cost. Mayor Hoan expressed his hope that this recognition of chemistry would become nation wide.

Welcome and Response

State Senator Oscar Morris welcomed the society on behalf of the Milwaukee Association of Commerce, as also did the Rev. Albert C. Fox, president of Marquette University, representing the academic interests of the city. The response of the society's president, E. C. Franklin, was followed by the general addresses.

Chemical ideas must be marketed as a commodity if we would demonstrate the earning power of research. This is the outstanding fact that must be appreciated by "the downtrodden chemist," in the opinion of Charles F. Burgess as presented in his address on marketing chemical discoveries. The easiest way to dispose of the new chemical idea is by publication. The more remunerative ways are by employment in industrial research for corporations, which then own and use the results of research, or by privately supported research, resulting in a patent or secret process which is then sold or reassigned on some royalty basis. But as one would expect, the more profitable ways demand the application of business methods and the study of legal and commercial features foreign to the science of chemistry or even to its technical applications.

Industry does not belittle the research chemist. It knows well the need of his leadership into new and enlarged fields. However, to be useful the ideas resulting must be presented in understandable language and they must be fitted into existing practices by slow and careful business methods upon which the chemist is apt to look down. The industrial manager will welcome the chemist who appreciates the business side of the problems and can sympathetically co-operate in their solution.

In his address on "Bacteria and the Chemist," Arthur I. Kendall, dean of the Medical School of Northwestern University, discussed the selective reactivity of the lower organisms to their chemical environment. He reviewed many well-known evidences of bacterial action, including a number of important industrial applications.

More of Which Later!

The week at Milwaukee was an eventful one. The prize announcements made there are obviously of importance—the decisions by the council no less so. But that is by no means all that happened at the fall meeting of the A.C.S. The technical sessions yielded much material of very general interest. These sessions, with the details of trips made through Milwaukee's industries and to Madison, will be reported in full in next week's *Chem. & Met.* Don't miss the story!

Prize Essay Contest Announced

A significant event of the week's meeting was the announcement of a prize essay and scholarship plan for which Francis P. Garvan and his wife have donated funds as a memorial to their daughter Patricia. Ten thousand dollars in gold will be offered in prizes for essays on subjects of chemical interest, an arrangement being made to provide for six prizes in every state. Approximately $20,000 in scholarships to Yale or Vassar is to be awarded to the state-wide winners of the essay contest. Several hundred sets of books relating to chemistry are to be placed in accredited high schools throughout the country by the funds set aside by Mr. Garvan.

Very general interest in this contest has been displayed by members of the society, most especially by those who are likewise educators. It is stated that several state universities are planning to offer scholarships in connection with the prize essay contest. Should the contest this year prove to be a success, it is believed that Mr. and Mrs. Garvan will set aside a fund sufficient to endow the contest in perpetuity.

The details of another prize offer were made public by Dr. Edgar Fahs Smith on behalf of a committee of five which had been appointed at the Pittsburgh meeting. The gift of $25,000 to be given annually by the Allied Chemical & Dye Corporation is to be known as the "American Chemical Prize" and will be awarded to the chemist who has done most for the promotion of chemistry in America. A committee of seven, of which five are to be appointed by the American Chemical Society and two by the corporation, will have jurisdiction over the award. The unanimous adoption of Dr. Smith's report followed its presentation.

Many Fellowships Offered

It was announced that numerous fellowships in chemistry had been given by various manufacturing concerns to a large number of institutions teaching chemistry. Among these were the Hammermill fellowship amounting to $1,200 for work to be done at New York State Forestry School, Syracuse, N. Y.; the Grasselli Chemical Co., $750 and $500 fellowships at Massachusetts Institute of Technology; the Public Health Institute of Chicago, two fellowships of $6,000 and $3,000 each at Northwestern University; the National Lime Association, $1,000, Massachusetts Institute of Technology; the Palmolive Co., $2,500, at Cornell University. It was announced that the du Pont company had renewed all of its fellowships. Lafayette College announced that $3,600 had been awarded for research in plasticity. It was also announced that the Fleischmann Co. had provided for a fellowship at the University of Minnesota for research work on baking.

Intersectional Meetings

Of the matters of society procedure and policy, the two most important subjects under discussion were intersectional meetings and classified membership. Neither committee was ready to report a definite plan of action, but many helpful suggestions accrued as a result of the discussion. Prof. C. E. Coates of the former committee made an informal statement of data obtained by questionnaire. Of twenty-nine sections well distributed geographically, nineteen preferred one general meeting and one intersectional meeting each year. About half the number believed the responsibility for carrying out the intersectional meetings should rest with the local sections involved, although a number urged the joint support of the national society.

Membership Should Be Prized

The same request was made by Prof. James Kendall on behalf of the committee on classified membership. He pointed out, and was later confirmed by a number of the council, that there is a growing feeling that something should be done to make membership in the society more highly prized. F. C. Whitmore of Northwestern maintained that the problem was with the so-called lower stratum of the profession who

were unqualified to be classed as chemists. Some others present, notably H. E. Howe, Secretary Parsons, and R. A. Gortner of Minnesota, were of the opinion that the establishing of a class of fellows of recognized standing and achievement would mark the real solution of the problem.

A scheme to provide more money to local sections was presented on behalf of the advisory committee, which recommended that a rebate of $5 be given to the section for each new membership and $2.50 for each non-member renewal. This was approved with certain perfecting amendments.

Section at Penn State

A petition to establish a section at State College, Pennsylvania, met with approval, as did a request that the Division of Leather Chemistry be permitted to modify its name to include both leather and gelatin.

Washington, D. C. was selected for the spring meeting, 1924, and the long-standing invitation to meet at Ithaca, N. Y., in the fall of 1924, for the dedication of Cornell's new chemical laboratory, was also accepted.

Regional Directorship Plan

A number of important changes in the constitution and bylaws of the society were made in accordance with suggestions formulated by the advisory committee in carrying out the instructions given last spring at New Haven. An executive committee was organized to replace the war-time advisory committee "to act for and on behalf of the council in all matters of national policy and import" and in addition exercise the usual powers of an executive committee. A regional plan of directorship was approved providing the election of one director from each of six districts made up as follows:

	Total No. of Members	Members in Local Sections
1st District Me., N. H., Vt., Mass., R. I., Conn., and Canada	1,558	1,166
2nd District New York and New Jersey	2,763	2,435
3rd District Penn., Del., and Ohio	2,077	1,859
4th District Ala., Ark., D. C., Florida, Ga., Ky., La., Md., Miss., N. C., Okla., S. C., Tenn., Tex., Va., W. Va.	1,407	1,113
5th District Ill., Ind., Mich., and Wis.	1,829	1,571
6th District Alaska, Ariz., Calif., Colo., Hawaii, Idaho, Iowa, Kans., Minn., Mo., Mont., Nebr., Nev., N. Mex., N. D., Oregon, S. D., Utah., Wash., Wyo.	1,868	1,550

One of the interesting word battles centered around an attempt to reduce the number of members of the council. In accordance with its instructions the advisory committee had studied the problem and came to the conclusion that adequate reduction could be attained by denying the right of proxy and substitution for regular councilors absent from meetings. Secretary Parsons' defence of the proposal was in vain; it was voted down by a large majority. The final climax came when a motion was passed entirely reversing the council's previous stand on reducing its number—it being maintained that the present organization was quite satisfactory for efficient conduct of the society's business.

News Notes

The Kansas Portland Cement Co. of Bonner Springs, Kan., on Sept. 5 changed from the dry to the wet process of manufacturing cement. This process, in which a slurry is fed into the kiln, is also in use at one other cement plant in this section.

One of the few blast furnaces using charcoal as a reducing agent is at Ashland, Wis. This furnace recently closed due to a demand for higher wages.

The large asbestos mines at Yale, B. C., which were discovered some years ago, and which stopped shipping at the outbreak of the war, are to resume operations shortly.

The Engineers' Club, Philadelphia, is to be the scene of a conference on Oct. 16 at which the subject under discussion will be "The Pollution of Streams," especially with the pollution due to industrial waste. Complete program with titles of papers and names of speakers will be announced in *Chem. & Met.* previous to that date.

Drilling operations for potash are to be commenced in the near future on Pelee Island, near Chatham, Ont. The work will be undertaken by a large Chicago firm as the result of a report by a geologist who, after making a thorough investigation, declared potash of excellent quality could be found in large quantities.

The New York Chemists' Club is to celebrate its silver jubilee during October. Dr. William H. Nichols, one of the charter members of the club, has consented to preside over the ceremonies. Special efforts are being made to bring together all the members through whose efforts the club has achieved its present degree of success.

A contract for packing in cartridges several million pounds of TNT and nitrate of soda has recently been awarded to the du Pont company. This is government material and will be used in road work during the next 2 years.

A co-operative analytical program is announced by the American Oil Chemists Society under the direction of the refining committee, of which H. J. Morrison, Procter & Gamble Co., is chairman. Those desiring to enter this program should send to the chairman for samples of oil, which are to be supplied at intervals for 5 months. The object of this work is standardization of analytical results.

Steel manufacture has been started in Kansas City by the Sheffield Steel Co. The company is dependent on coke and ore which is shipped in, but uses local flux and as large a percentage of scrap as possible.

Ceramic Society Has Meeting at Chemical Exposition

The program of the Ceramic Society's meeting to be held on Wednesday, Sept. 19, at 2 p.m., is made up of a group of papers of very general interest. Following the technical meeting the society is to hold a dinner at the Hotel Commodore, to which ladies are invited. The evening will be devoted to the exposition. The program follows:

A. PROMOTING FUEL ECONOMY IN KILN MANAGEMENT.
- (1) Report of Results in Co-operative Investigations by Refractories Manufacturers Association and U. S. Bureau of Mines. Frederick W. Donahoe, secretary, Refractories Manufacturing Association.
- (2) Possible Economies in Kiln Firings. George A. Bole, U. S. Bureau of Mines.
- (3) Application of Hand Stokers to Kilns. Henry H. Hyde, Flynn & Emrich Co.

B. INDUSTRIAL ART.
- (1) The Industrial Art Movement, Its Possibilities in Ceramic Industries. Richard F. Bach, Curator Industrial Arts, Metropolitan Museum.
- (2) Method of Color Measurement, an Industrial Need. A. E. O. Munsell, Munsell Color Co.

C. FEDERAL CO-OPERATIVE MOVEMENTS.
- (1) Investigations by and Purposes of the Federal Specifications Board in Reference to Ceramic Products. R. F. Geller, U. S. Bureau of Standards.
- (2) The American Construction Council, Its Aims and Methods. D. Knickerbocker Boyd, vice-president.

D. REFRACTORIES.
- (1) The Properties of Some Commercial Refractories. R. M. Howe, Kier Fire Brick Co.
- (2) The Manufacture of Refractories. W. F. Rochow, Harbison Walker Refractories Co.

Changes Taking Place in du Pont Personnel

Extensive changes in organizations of high explosive plants of the du Pont company were effective Sept. 1. D. S. Robinson of the du Pont, Wash., works left the company to engage in business for himself in Tacoma, Wash. He was succeeded by F. T. Beers, who was transferred from a similar position at Barksdale, Wis., and R. T. Cann, manager at Louviers, Colo., moved to Barksdale. E. B. Yancy of Repauno works, Gibbstown, N. J., took charge of Louviers works and the position of assistant manager at Repauno, which this change left vacant, was filled by E. R. Wright, who held the same title at Barksdale. F. C. Evans was advanced from acid superintendent at Barksdale to assistant manager, while Arthur Skerry of Louviers took charge of the Barksdale acid department.

Washington News

Active Demand for Dyes Seized in the Ruhr

Domestic producers of dyestuffs need have no fear that sales of seized German dyes by the French and Belgian Governments will upset the market in this country, according to information from Chemical Trade Commissioner F. E. Breithut in Europe. According to word received from Major Breithut by C. C. Concannon, chief of the Chemical Division of the Department of Commerce, there appears to be an agreement on the part of the selling agencies not to dispose of the exportable portion of these dyes below the market price. As a matter of fact, it was stated that demand for these dyes was coming from a number of countries, thus assuring good prices.

The revised figures on the quantity of dyes seized by the French and Belgians in the Ruhr is now placed at 5,400 net tons, of which 2,300 tons has been retained by the two countries for domestic requirements. Of the 3,100 tons balance, 1,150 tons is indigo, divided approximately: Indigo 20 per cent, 632 tons; indigo 100 per cent, 119 tons; indigo grains, 55 tons; indigo reduced, about 350 tons. The remaining 2,040 tons contains 350 tons of alizarine red, leaving 1,500 or 1,600 tons of miscellaneous dyes to be sold for export.

Scarcity of Sodium Nitrate in French Markets

The situation in heavy chemicals in France was calm during August, with little changes in prices, according to a cablegram to the Department of Commerce from Acting Commercial Attaché J. F. Butler at Paris. Secondary chemicals were relatively active. Glass-making industries were dull. Tannery stocks are small. The dyestuffs situation is calm and there is a slack demand for paint-making materials. French manufacturers will probably be unable to meet next season's demands for sodium nitrate, the cablegram states, and stocks of nitrate of lime are lacking. Prices of naval stores are lower.

F.T.C. Decision Against Paint Manufacturer

The use of the legend "U. S. Quality Paint" in connection with a product not manufactured for the United States Government or according to government specifications and requirements is ordered discontinued by the Federal Trade Commission.

This decision has been made public by the commission in the case of Edward Frohlich, of Detroit, Mich., and E. A. Benedict, of Cleveland, Ohio. The commission found that Edward Frohlich, trading under the name of Frohlich Glass Co., manufactured a house paint and at the suggestion of respondent Benedict, labeled such paint with the words "U. S. Quality Paint." Such paint, the findings state, were not made for the United States Government nor according to any government specifications.

The commission's order prohibits the respondents from using a label, mark, or brand, containing the words "U. S. Quality Paint" upon paint manufactured or sold by them or of selling or offering for sale in commerce paint, the containers of which bear the label, mark or brand "U. S. Quality Paint" or any similar label, mark or brands that in either instance would tend to induce the belief that the paint therein contained was manufactured for use by the United States Government or prepared according to specifications or requirements of the United States Government, unless the paint in the containers so labeled was, and is, in fact manufactured for use by the United States Government or prepared according to specifications or requirements of the United States Government.

Acetate of Lime Production Declines in July

The Department of Commerce announces the July production of acetate of lime and methanol based on reports received from manufacturers. The following table shows for the first 7 months of the year the operations of wood-chemical plants:

1923	Production — Acetate of Lime, Lb.	Methanol, Gal.
January	15,434,065	863,608
February	13,154,735	724,037
March	14,732,054	786,774
April	13,237,584	710,987
May	14,667,584	796,481
June	14,129,529	727,458
July	12,873,572	645,673

To Use War Explosive for Blasting

Eighteen million pounds of sodatol, a surplus war explosive, will be available for distribution to federal agencies and the state highway departments about Oct. 1 for use in road construction, according to the Bureau of Public Roads of the United States Department of Agriculture. The supply is also to be drawn on by farmers through state distributing agents for use in land clearing, but it is expected that the supply will be ample to meet all demands.

Sodatol is a high explosive made of mixing together TNT and sodium nitrate and is packed in boxes of 50 lb. each, containing 120 cartridges. Each stick is approximately equal in strength to a stick of 40 per cent dynamite and is used in a similar manner, a No. 6 cap being used as a detonator.

A contract for cartridging has been let to the du Pont company and shipment will be begun from Barksdale, Wis., about Oct. 1 and it is expected later from Repauno, N. J., Ashburn, Mo., Louviers, Colo., and Dupont, Washington.

The new supply of explosive is well adapted to road work. It is non-freezing at all ordinary temperatures, causes no ill effects from handling or open air blasting and is a safe explosive when given the same care as that required for dynamite. It is necessary that it be stored in a dry place.

Trade Notes

A cable from Trade Commissioner J. W. Sanger at Melbourne says that a bill is expected to be introduced in the Australian Parliament abolishing the import duty on sulphur and granting a bounty to domestic producers of sulphur.

E. Billings, Jr., has left Binsser & Co., Hastings-on-Hudson, N. Y., to become sales manager for Godfrey L. Cabot, Inc., Boston, Mass.

Oil and gas are reported to have been struck on land taken over by the Certainteed Products Corp. from the Acme Cement Co. in the recent consolidation of the companies.

A report from Youngstown, Ohio, states that the Republic Rubber Co. has increased its minimum daily tire output to 1,000 tires. Mechanical goods departments are working close to capacity and solid tire making has increased about 60 per cent.

The Continental Can Co. will move its main offices on Nov. 1 from Syracuse to the Pershing Square Building, New York City.

The Grasselli Chemical Co. will construct a mixing plant and laboratory in its factory at Charlotte, N. C.

The General Supply & Chemical Co. has been formed at Trenton, N. J., with H. M. Royal as manager. The company is handling a varied line of chemicals, pigments, oils, etc.

Changes in Argentine export duties for September include linseed in sacks, from 3.77 to 3.63 pesos; linseed in bulk, from 3.40 to 3.25 pesos; quebracho extract, from 2.13 to 1.79 pesos.

Charles L. Burton, for many years engaged as a broker in vegetable oils in New York, died at his home, West Brighton, S. I., on Sept. 7.

Suit for a receiver, charging mismanagement and insolvency, has been filed by fourteen stockholders in the Circuit Court in St. Louis against the Allan-Pfeiffer Co., chemical manufacturer of that city. The company is capitalized at $500,000.

Fluctuations in Exchange Influence Values for German Chemicals

Prices in First Half of Year Rose in Proportion to Declines in the Mark—At End of June Were Twenty Times Those Prevailing on Jan. 1

ASSISTANT Trade Commissioner W. T. Daugherty, in a report forwarded from Berlin under date of July 24, states that the German chemical industry, like other industries in Germany, was extremely sensitive to currency depreciation during the first 6 months of 1923. Prices of most chemical products rose proportionately as the mark declined. The scarcity of some products, however, caused by the shutting down of plants in the Ruhr and the Rhineland, led to an increase even in the gold price. It is to be observed, in general, that a curve of exchange rates would be closely followed by a curve of prices.

Prices began to increase in January and reached a high point at the beginning of February when the dollar also attained a temporary maximum. A period of stable exchange halted price increases for the time being, but improvement in the exchange value of the mark did not, as a rule, lower them, although a slight decrease was noted about the middle of February, lasting until about the middle of April.

Sales were very active during the January boom in the market, but declined greatly in expectation of lower prices when stabilization began. Only when the stabilization failed, about the middle of April, did the market again revive. Prices displayed an upward tendency as business improved. Business dulled somewhat at the end of April when the government announced further measures to restrict speculation in foreign exchange.

When mark depreciation set in anew at the beginning of May, prices rose uninterruptedly and dealers were inclined to withhold their goods, awaiting further increases. This naturally disturbed market conditions.

At the beginning of June further price increases appeared probable, and buyers, in their "flight from the mark," bid against one another to get goods while they could. A serious shortage of stocks resulted. At the end of June factory prices of nearly all products were again raised substantially and the freight rate increase of July 1 aggravated the situation.

Inland market prices of almost all goods had increased by the end of June to an average of twenty times the prices of January 1.

In export sales the influence of the exchange rate was more keenly felt than in the domestic market. The increase in the rate of exchange at the beginning of the year resulted in an improvement of export business. This ceased suddenly when the dollar rate declined as a result of the government's pegging action, though domestic prices rose generally toward the world market, and in some cases above it. The result was that prices fixed in foreign currency had risen to the domestic prices and export business fell off. It was then necessary to decrease the export supplement on chemicals, and this was accordingly done.

When the market improved in April it was possible to decrease the then high export prices. Foreign sales resulted and business again revived. At the end of June further export price decreases were made and export sales again stimulated. This has resulted in a similar action on the part of American and English exporters to combat German competition.

At this time the inland prices of many articles exceed the world prices, making export of these lines difficult if not impossible. So far as can be observed, this instability of the German chemical market is by no means at an end.

Canada's Pulp Industry Buys Materials Here

Although large supplies of pulpwood and lime are readily available in Canada, the pulp and paper mills are at present importers of many of the raw materials entering into the manufacture of chemical pulps and paper. In the fiscal year ended March 31, 1923, sulphur valued at $1,673,662 was imported, chiefly from the extensive Louisiana sulphur deposits; of this amount about three-fifths was used in the pulp and paper industry. Sulphur can be produced from domestic deposits of pyrites, but under present conditions cannot compete with the imported brimstone. Imports of alum and salt cakes amounted to over $1,000,000, of which seven-tenths was used in the manufacture of kraft pulp.

Canada's dependence upon outside sources for this chemical will probably diminish as the sodium sulphate deposits of the prairie provinces are gradually developed. Again, though kaolin is produced in small quantities in the province of Quebec, the value of imported clay used in the pulp and paper industry is $200,000 yearly.

Other products which are imported include resin, alum, pulpstones, acid-proof refractories and soapstone linings. Some of these are being produced in Canada and as the pulp and paper industry grows, a large enough market will become available to warrant the development of Canada's resources for these commodities.

Fred E. Signer Dead

Fred E. Signer, general sales manager of the Butterworth-Judson Corporation, died on Sunday, Sept. 9, after a brief illness. He was born in Buffalo in 1860 and when a young man engaged in railroad work in his native city. In 1908 he was appointed contracting freight agent of the Wabash at Chicago and represented that road on the Chicago Board of Trade. In 1916 he came to New York to accept the position of general Eastern freight agent of the Lehigh Valley R.R. Four years later he resigned to become general sales manager for the Butterworth-Judson Corporation, in which position he remained up to the time of his death.

Mr. Signer was very popular throughout the chemical trade and had been prominent in the affairs of the Chemical Salesmen's Association. The latter organization will hold its annual meeting and election of officers on Sept. 20 and Mr. Signer had been nominated for the office of president. Mr. Signer was vice-president of the Synthetic Organic Chemical Manufacturers' Association.

Technical Paper Men to Meet at Appleton, Wis.

The fall meeting of the Technical Association of the Pulp and Paper Industry is to be held at Appleton, Wis., from Oct. 25 to 27. The meeting is to be held in conjunction with that of the Northwestern Division of the Pulp and Paper Mill Superintendents Association. The Cost Association of the Pulp and Paper Industry will also meet at that time. It is expected that at least 150 members of the technical association will be present and that no less than 350 other men interested in other lines of the industry will also be in attendance.

The technical program will consist largely of progress reports on the various problems comprising the special activities of the several committees during the present year. "Waste in Industry" will in all likelihood be the topic most discussed. Problems of drying and of the general distribution of heat in the mill are on the program. Likewise a report on progress in methods of paper testing will be heard and a business session has been arranged. The chief point of interest which is to be visited is the Kimberley Clark Mills, near Appleton.

Fermentation Fellowship Founded

A. P. Strietmann, president of the Biscuit & Cracker Manufacturers' Association, has founded a research fellowship at the University of Minnesota on fermentation problems arising in the industry of which he is the head. This research will be conducted in the department of biochemistry, of which Dr. R. A. Gortner is the head, and will be under the immediate direction of Dr. C. H. Bailey. A. H. Johnson has been selected to carry on the work under this fellowship.

Dayton Offers A.E.S. Unusual Facilities for Fall Meeting Sept. 27-29

Interesting Convention Assured—Technical Details Fully Arranged—City's Industries Well Worth Inspection

THE FALL meeting of the American Electrochemical Society is to be held at Dayton, Ohio, a city which is noted as an engineering, industrial, mechanical and manufacturing center. The technical sessions of the society Sept. 27 to 29 will be held at the Engineers' Club, while the Miami Hotel will be the headquarters during the meeting. The order of arrangement of meetings and other activities follows:

Sept. 27, 1923, Thursday, a.m.—Technical session at the Engineers' Club for the reading and discussion of papers pertaining to the symposium, "Electrochemistry of Gaseous Conduction," with Dr. Duncan MacRae, of the Westinghouse Lamp Co., Bloomfield, N. J., in the chair.

Thursday p.m. — Group luncheons, Engineers' Club, followed by round table discussions on the following subjects:

"Electric Furnace Brass Foundry Practice," H. W. Gillett, chairman.

"The Development and Future of Electrodeposition," S. Skowronski, chairman.

"Organic Electrochemistry," C. J. Thatcher, chairman.

"Utilization of Chlorine," A. H. Hooker, chairman.

These round table discussions will be informal and members and guests interested are encouraged to take part.

Thursday evening—Outdoor meeting and smoker at Triangle Park. Informal talk by Charles F. Kettering, president, General Motors Research Corporation. Entertainment staged by members of the society.

Friday a.m.—Technical session continued, Engineers' Club.

Friday afternoon—Visits to plants. Sightseeing trips. Golf.

Friday evening—Lecture at the Engineers' Club on "Recent Researches on the Electrochemistry of Gaseous Conduction," by Dr. H. B. Wahlin, of the University of Wisconsin.

Saturday a.m. — Technical session, Engineers' Club.

For those who are interested in industrial and engineering progress, Dayton is an interesting city. Having manufacturies requiring high technical skill, the engineer is found closely associated with all its industries. The engineer's activity in Dayton takes many specialized forms. The Dayton Engineers' Club is a refreshing surprise to the visitor, of what a clubhouse, designed and built by engineers for engineers' use, can provide in utility, convenience, comfort and beauty.

Paralleling the experimental research in aviation matters which has been carried on in Dayton, the extensive, well-equipped laboratories of the General Motors Corporation, located here, are engaged in automotive research. These experimental laboratories form the largest institution of its kind in the world, devoting their entire activity to problems and practices of the automotive industry. The laboratory buildings of the General Motors Research Corporation contain 7 acres of floor space with large acreage devoted to flying fields and experimental farms for the development of new automotive equipment and the testing of present equipment.

At this laboratory, science is placed on a production basis, to develop better means for transportation for civilization. This laboratory is a large factory devoted to building experimental and improved advance designs and determining the fundamentals that govern good service and good transportation.

H. M. WILLIAMS
Chairman of general Committee on Arrangements for Meeting

The Duriron Co., well known throughout the chemical industry, is also located in Dayton. This foundry and machine shop specializes in castings that are acid-resisting. All types of pumps, pipe and fittings as well as kettles and pots, and much other special equipment for the chemical industry, make up the production of this concern.

Within automobile driving distance of Dayton the many other manufacturing towns devoted to textiles, paper, steel making, pottery—all of interest to the technical man.

Definite plans for the spring meeting to be held in Philadelphia April 24 to 26 are announced. The two symposiums definitely decided upon for this meeting are "Organic Electrochemistry" and "Recent Progress in Electrolytic Refining." The limiting date for the acceptance of papers is Feb. 15, 1924.

Financial Notes

The Tennessee Copper & Chemical Co. has declared regular quarterly dividend of 25c. a share.

Reports as recently published, to the effect that the Anton Jurgens Margarine Works of Holland would be reorganized and recapitalized, have been denied by that company.

The report of Chemical Products, Ltd., for the year ended June 30 shows gross profits of $18,060, with a net trading loss of $25,302.

The Middle States Oil Corporation has passed its quarterly dividend. In the preceding quarter the company paid 1 per cent extra in addition to the regular quarterly dividend of 3 per cent.

Stockholders of Standard Oil of New York have approved increase of $10,000,000 in authorized capital stock, to $235,000,000, or 9,400,000 shares, and authorized directors to issue all or any part of increase to employees. Increase in number of directors from nine to eleven was also approved.

The Gold Dust Corporation has been incorporated at Albany with a capital stock issue of $5,000,000. It is understood that this is a subsidiary company of the American Cotton Oil Co. and will take over the soap end of the business.

Upon the recommendation of the Deutsche bank and the banking house of Raehmel and Boellert, Berlin, 80,000,000 marks of new common stock of the J. D. Riedel Aktiengesellschaft, Berlin, have been admitted to the Berlin Bourse, according to a report from Consul E. Verne Richardson at Berlin. The Riedel concern is one of the most prominent of Berlin's chemical manufactories. Despite its modest capital of 60,000,000 marks, its reserves at the close of the calendar year 1922 exceeded three billion marks. At the beginning of 1923 the capital was increased to 150,000,000 marks, and 80,000,000 marks of this issue has been listed on the Bourse.

May Discontinue Experiments on Briquet Production

The province of Manitoba has announced that it will not continue to share the cost of experiments in the briquet plant at Bienfait, Sask., by which it has been hoped to make a serviceable fuel out of low-grade coal. Experiments have been carried on by the federal government and the governments of Manitoba and Saskatchewan. W. R. Clubb, provincial minister of public works in the Manitoba Government, recently stated that it had not been definitely decided whether or not the other governments would carry on the work.

United States Foremost Foreign Market for Alsatian Potash

Annual Production Increasing—French Consumers Protected —Price Tendency Has Been Downward

LESLIE E. WOODS, Vice-Consul at Strasbourg, in a report on Alsatian potash says:

The potash field of Alsace is situated in the Department of Haut-Rhin just north of the City of Mulhouse. It covers about 77 square miles, and is estimated to hold approximately 200,000,000 tons of pure potash. It was discovered in 1904, when a pit bored to the depth of 2,000 ft. in search of coal and petroleum revealed a bed of potash salts.

In 1908 the exploitation was commenced and in 1914 there were four groups operating. They were:

I. Groupe des Deutsche Kaliwerke, consisting of six companies with an aggregate capital of 11 million marks and concessions amounting to about 16,000 acres (6,400 hectares).

II. Groupe Wintershall, two companies with capital totaling 6 million marks, concessions of 7,900 acres (3,200 hectares).

III. Groupe Hohenzollern, two companies, having a total capital of 6 million marks and concessions covering 7,400 acres (3,000 hectares).

IV. Groupe Alsacien, comprising four companies with an aggregate capital of 8 million marks and 16,300 acres (6,600 hectares) of concessions. The present capitalization of this group, under the name of Mines de Kali de Sainte-Therese, is 10 million francs.

The first of these groups had in 1914 a total of seven pits; the others in their order above had two, four and four pits. Of the four belonging to the last-mentioned group only two were in operation. The production in 1913 and 1914 of the first three groups was 371,780, 95,216 and 15,103 tons of crude salt for the first year and 184,242, 78,487 and 38,847 tons in 1914.

The organization of the industry in 1914 may be summarized as 31,000,000 marks capital, concessions of 47,600 acres, or a little less than 200 square kilometers, and seventeen pits, of which twelve were functioning.

In 1918 the first three groups were sequestered and are still held by the French Government. In February, 1923, a proposal was voted in the French Chamber of Deputies, 550 against 6, for the leasing of the sequestered groups to a new company for the period of 75 years, the new organization to issue stock which should be offered for subscription in the following proportions to the classes named:

Agricultural syndicate and associations, 50 per cent; manufacturers consuming potash, 10 per cent; individuals and communities of Alsace-Lorraine who suffered damages during the war, 5 per cent; the Departments of Haut-Rhin, Bas-Rhin, and Moselle, and communities, chambers of commerce and co-operative insurance societies therein, 15 per cent; holders of shares in the sequestered companies which prior to Nov. 11, 1918, belonged to French citizens or Alsatians or Lorrains who have been reintegrated as French, 15 per cent; staff of the company or sales company thereof, and the workingmen of the mines of the company, 5 per cent.

It was proposed further that the mines should have but one sales agency; that the needs of France must be served before foreign markets; and that the price for which the products shall be offered in France shall not be higher than that for foreign customers. At the present time there is a single sales agency for both the sequestered and unsequestered groups. It is known as the Société Commerciale des Potasse d'Alsace, at Mulhouse, and has a branch of the same name at New York City.

America is the foremost foreign market of the Alsatian mines, and although there was a drop in the actual quantity sold to the United States in 1921 as compared with 1920, the actual percentage of pure potash sold increased. This is true of the amount sold in France. Three years' distribution is shown here:

PURE POTASH (IN TONS)

Year	France	America	England	Divers	Tota
1919	48,958	26,702	4,499	13,571	93,730
1920	86,578	35,967	17,890	38,740	199,175
1921	54,664	21,340	6,864	26,855	109,175

The production of the mines since 1918 shows an increase each year. In 1920 under abnormal conditions the production mounted to more than twice the quantity for the preceding year, but returned thereafter to a normal increasing figure. The statistics show the following:

PRODUCTION OF CRUDE SALTS (IN TONS)

1918	1919	1920	1921	1922	June 1, 1923
333,500	591,471	1,222,615	884,139	1,336,171	640,529

Since the latter part of 1921, when the price of potash, both the manufactured and crude salts, was lowered about 50 per cent, there have been still further decreases in the prices. This fact accounts for the lack of proportionate increase in the value of shipments with the increase of quantity sent the United States. The record of declared exports indicates:

POTASSIUM CHLORIDE (MANUFACTURED)

1921	.....	27,793 tons valued at $2,738,279
1922	.....	76,351 tons valued at 2,501,842
1st Qtr 1923	.....	25,822 tons valued at 912,911

KAINITE OR SYLVINITE (CRUDE)

1921	.....	59,077 tons valued at $1,675,349
1922	.....	187,850 tons valued at 1,877,495
1st Qtr 1923	.....	91,965 tons valued at 714,442

The outstanding feature of the year of 1922 for the potash industry was the regularity with which orders were received, and the absence of a dull season.

An evidence of the prosperity of the unsequestered group is the payment of a dividend of 20 per cent on May 19, 1923. The sequestered group has not, it is learned indirectly, fared as well. Information concerning the latter group is less readily obtainable.

Paper From Straw May Be Commercially Possible

Sir Frederick Becker Convinced That With Proper Transportation Facilities Such a Plan Is Feasible

After discussing his plans with industrial, railway and banking heads in Canada, Sir Frederick Becker, the British paper manufacturer, who is now in Canada, is convinced that an opportunity exists for the manufacture of paper from straw in that country. Providing the necessary encouragement can be received from the railways and other organizations in the matter of transportation, etc., it is likely that a mill to manufacture high-grade paper from straw will be in operation somewhere in western Canada before the 1924 crop is ready for harvest. The plans of Sir Frederick Becker call for the establishment of the mill at some convenient central point. This has not been chosen, but it is possible that a paper mill may be established first at Winnipeg and likely a second mill somewhere in Saskatchewan.

To Apply European Practice

Sir Frederick stated, in an interview, that the application of the system of making paper from straw is the real reason for his present visit to Canada and that he is not here to experiment but to apply knowledge that has been worked out in experiment and practiced on in Europe. The manufacture of paper from straw, Sir Frederick pointed out, is not a new process, but in the past has not always been successful.

The Becker interests in pulp and paper in Canada are extensive and include strong holdings in and connections with the Chicoutimi Pulp Co., the largest groundwood mill in Canada; the Bay Sulphite Co., which includes the former St. Lawrence Pulp & Lumber Co.; the Chicoutimi Freehold Estates, which owns large timber limits in Quebec, not now being developed; the Clyde & Sissiboo Pulp Co. in Nova Scotia; the Roberval & Saguenay Railway and the power development at Chicoutimi. Changes in the output of some of these companies are being discussed during Sir Frederick's visit, it is learned.

London Tallow Auction

At the regular weekly auction, held September 12, 2535 casks were offered and 1753 were disposed of. Mutton sold at 42s.@42s. 6d. and beef at 40s. @42s. 6d. per hundredweight.

Facts and Figures That Influence Trade in Chemical Products

Market Conditions

Current Prices
Imports and Exports
The Trend of Business

Improved Position of Consuming Trades Broadens Demand for Chemicals

Volume of Sales Increáses, but Buyers Still Cautious—Moderate Sized Lots Given Preference

WHILE business in chemicals has shown improvement since the turn of the month, many large consuming trades are still working below capacity and are pursuing the policy of taking on raw materials only for short periods ahead. The tanning trade was very quiet throughout the summer and is gaining ground very slowly. Reports from rubber centers say that shipments of manufactured products are exceeding production by from 50 per cent to 100 per cent. Production schedules in this industry are dependent upon reduction of stocks on hand and by the volume of new orders received. To date new business has improved only in a moderate degree. Tire production is reported to be from 50 per cent to 60 per cent of the high point in the spring months. Varied reports are heard regarding the textile industry but many plants are not running full time.

The weighted index number for the week moved upward under the influence of higher markets for cottonseed oil, denatured alcohol and a few other allied products. In general prices for chemicals are fluctuating within very narrow limits without any decided tendency in any direction.

At the public hearing on nitrite of soda, held before the Tariff Commission last Monday, a prominent manufacturer stated that the price level, as forced by competition from imported material, made production unprofitable and he petitioned for a 50 per cent advance in the existing duty of 3c. per lb. Incidentally sales of foreign made nitrite have been made considerably under the openly quoted prices.

Bleaching powder has attracted more than usual attention because of the weakness in selling prices. Consumption, especially in the paper trade, has taken a decided slump. To offset this production was curtailed in recent months but stocks in sellers' hands accumulated and selling pressure has caused sharp price declines, and the outlook is far from promising.

Domestic producers of arsenic have booked considerable business for future deliveries, and the market closed in a strong position with one of the leading producers refusing to quote. Uncertainty about Japanese offerings also has had a strengthening influence.

German chemicals underwent no material change during the week, but the possibility of developments in the Ruhr was given considerable attention with conflicting views held regarding the effect on prices.

Yellow Prussiate of Potash Lower—Bleaching Powder Sells at Private Terms—Imported Sal-ammoniac Higher—All Grades Denatured Alcohol Up 2c. per Gal.—Mineral Acids Easy—Arsenic Offerings Restricted—Formaldehyde Quiet and Weak.

Acids

Acetic Acid—The slow position of the export trade is shown by the fact that in July only 31,857 lb. were exported. For the 7 months ending July, exports were 572,050 lb. as compared with 3,165,545 lb. in the corresponding period of 1922. Export demand at present is quiet but domestic consumers have been showing more interest and trading is reported to have gained in volume. Prices are quoted at: $3.38@$3.63 per 100 lb. for 28 per cent; $6.78@$7.13 per 100 lb. for 56 per cent; $9.58@$9.83 per 100 lb. for 80 per cent; $12@$12.78 per 100 lb. for glacial.

Boric Acid—Selling competition has been very keen for some time and while prices were generally regarded as low in comparison with production costs, a decline of ½c. per lb. has been announced. The present schedule of prices is on a basis of 9½@10c. per lb. in sacks, 10@10½c. per lb. in bbl., and 10½@11c. per lb. in kegs.

Citric Acid — Prices of imported grades are very close to actual costs and this is a factor in preventing wide fluctuations. Consuming demand is light and sellers are eager to dispose of stocks with the result that spot goods are available at 49@50c. per lb. which is about the level at which shipments from abroad are quoted on a duty paid basis. Domestic makes also are quoted at 49@50c. per lb.

Oxalic Acid—Prices are reported to be irregular. Imported acid has been pressed for sale and as low as 12c. per lb. has been quoted. Some reports credit sales under 12c. per lb., although there is a difference in prices according to grade and seller. Domestic producers have followed the course of imported rather closely and 12c. per lb. is quoted for the former at works.

Sulphuric Acid—While there has been some improvement in demand, many sellers have accumulated fairly large stocks, and in their desire to reduce holdings prices have been easy. There has been no open reductions in quotations but recent sales have been made at private terms with prices varying according to seller. On 60 deg. acid there are quotations of $9 to $11 per ton in tanks and 66 deg. acid is quoted at $15@$16 per ton in tanks.

Tartaric Acid—Demand has continued along quiet lines and there is an easy tone to values. Holders of imported acid have been willing to shade the open quotations in order to interest buyers and according to some reports odd lots could be picked up under 32c. per lb. Prices generally quoted were 32@33½c. per lb. The easy position of foreign made acid was reflected in the position of domestic but open asking prices for the latter were kept at 36c. per lb.

Potashes

Bichromate of Potash—While most sellers are quoting 10c. per lb. for spot and nearby deliveries, the market has not been steady and price shading has been a feature. Sales are reported at 9¾c. per lb., and as buying orders are not numerous, the market shows no tendency to steady itself. The tanning trade is still very quiet and buying from that quarter remains light.

Caustic Potash—Efforts to hold the spot market for imported caustic at 7¼c. per lb. have not been successful and there were offerings during the week at 7c. per lb. Prompt shipment from foreign ports also has been offered at 7c. per lb. Domestic caustic is not following fluctuations in the imported but has held on a steady basis of 9c. per lb. and upward according to quantity, f.o.b. works.

Carbonate of Potash—Stocks of 90-95 per cent carbonate have been reduced on spot and sellers who had previously sold at 6½c. per lb. were holding 6¾c. per lb. as an inside price. Other grades were unchanged in price with 80-85 per cent calcined quoted at 6@6¼c. per lb., and 96-98 per cent was offered at 6¾@7c. per lb. Bicarbonate of potash remained in a strong position with holders asking 9½@10c. per lb.

Permanganate of Potash—Most reports state that the market for imported material is working into a firmer position. However, there are a few

odd lots which can be bought at 17c. per lb., despite the fact that other holders are firm at 17½c. per lb. and upward. The import cost is said to run from 17½c. to 19c. per lb., which means that some spot goods are offered under replacement cost. Domestic makes are steady at 17@17½c. per lb. f.o.b. works.

Prussiate of Potash—Yellow prussiate of potash has been holding an irregular course for some time. During the week the market developed weakness and spot goods were offered as low as 30c. per lb. This was caused partly by lower prices for shipment from abroad, as the latter declined to 28c. per lb. Demand is far from active and stocks are held in many quarters.

Sodas

Acetate of Soda—This is one of the very quiet items of the chemical list. Stocks are held by second hands who are willing to sell at 5c. per lb. Makers are said to be meeting quotations of second hands although they openly quote 5¼@5¾c. per lb.

Bichromate of Soda—Some export inquiry was reported but domestic consumers have not bought as heavily as expected. The market is waiting for activity in a few industrial lines and in the meantime prices are easy under keen competition. Current market values are given at 7¾@7¼c. per lb. according to quantity and seller.

Caustic Soda—Consumers are ordering out regularly against old orders and new business in jobbing lots has gained in volume. Prices are on a steady basis with producers offering carlots for prompt shipment from works at $3.16 per 100 lb. This price also is quoted for futures over a restricted period with sellers not eager to quote on distant positions. Ground and flake are unchanged at $3.60 per 100 lb. at works. On jobbing lots for local delivery, prices are $3.80 per 100 lb. for 5 drums or more and $3.95 per 100 lb. for less than 5 drums.

Nitrate of Soda—The fertilizer trade has not been buying freely and the past week has developed nothing of importance. Quiet demand for stocks is affecting the spot price and while $2.45 per 100 lb. is quoted, it is possible to shade that figure. Futures are not receiving attention and prices are little better than nominal. Refined nitrate of soda is quiet but the market is steady at 4@4½c. per lb. for granulated, 5@5¼c. per lb. for crystals, and 5¼@5½c. per lb. for powdered.

Nitrite of Soda—The trade was interested in the hearing held last Monday before the Tariff Commission relative to a petition for an increase in duty from 3c. to 4½c. per lb. A prominent producer stated that it was not profitable to produce and sell nitrite at the prevailing market price. Imported nitrite was firmer during the week. The asking price ranged from 7½c. to 8c. per lb. but sellers were adhering closely to the quotations. In recent weeks price shading was common and some imported material sold as low as 6c. per lb. according to some reports. In view of the duty of 3c. per lb. this would indicate low producing costs abroad. Domestic nitrite is holding at 7½c. per lb. at works with only moderate call from buyers.

Prussiate of Soda—A firm undertone has continued throughout the period. The inside price for foreign prussiate was placed at 14c. per lb. Domestic prussiate also was steady at 14c. per lb. at works. Some improvement in demand was reported but call was felt largely for prompt material.

Miscellaneous Chemicals

Arsenic—There is a decidedly firmer feeling in the market for domestic arsenic. Contracts for large amounts were placed during the week. At the close one large producer had withdrawn from the market and others were asking 11@11½c. per lb. for all positions through next March. Imported grades on spot were firm at 10½@11c. per lb. and shipments were largely nominal with uncertainty about offerings from Japan.

Bleaching Powder — While selling pressure which developed during the summer was generally reported to be a customary procedure for that time of year, it is evident that consumption has fallen off to an unusual degree to admit of the continued slow buying movement. The largest consumption is in the paper trade and the latter has not been buying in a normal way. In addition producers of bleach have sacrificed values in a trade war and it is freely admitted that bleach has sold under 1c. per lb. There is no fixed price at present and private terms are in effect.

Calcium Arsenate—The firmer position of arsenic has had no effect on the market for arsenate and the latter is feeling the effects of a slow buying movement. With the active buying season over, producers are carrying heavy stocks with no immediate outlet. Prices are quoted at 12@14c. per lb. but these figures do not mean much under existing conditions.

Copper Sulphate — Domestic grades are reported to be quiet with prices steady at 5.10@5.25c. per lb. Imported material is offered on spot at 4¾c. per lb. and shipments, both prompt and for later positions, are offered at 4½c. per lb.

Formaldehyde—Consumers have restricted buying in recent weeks and as stocks are said to be large the market has eased off in price. First hands are now openly offering at 13c. per lb. but this represents a readjustment of the quotation to conform with actual selling prices rather than a positive decline in value. Second hands also are offering at 13c. per lb.

Lime Acetate—Official figures place production of acetate of lime in July at 12,873,572 lb. which is lower than for any preceding month of the year. Exports in July were 2,946,051 lb. valued at $114,133 as against 3,115,168 lb. valued at $56,949 in July last year. For the 7 months ended July exports were 17,995,098 lb. as compared with 19,625,760 lb. in the corresponding period last year. The market has undergone no change and producers continue to quote $4 per 100 lb.

Salammoniac—Low priced offerings of imported material have been absorbed and with demand improving, the market was stronger. Spot material was held at 6¼@6½c. per lb. according to seller. Domestic grades were steady with 7½c. per lb. quoted for white granular.

"Chem. & Met." Weighted Index of Chemical Prices

Base = for 1913-14

This week	173.22
Last week	170.69
Sept., 1922	148.00
Sept., 1921	147.00
Sept., 1920	267.00
Sept., 1919	272.00
Sept., 1918	278.00

Higher prices for denatured alcohol and crude cottonseed oil were factors in the advance of 313 points in the week's index number.

Alcohol

Producers announced an advance of 2c. per gal. in all grades of denatured alcohol. Demand has increased, and, this was given as the principal reason for the uplift in quotations. Formula No. 1, 188 proof, closed at 41c. per gal., in drums, and 47c. per gal., in bbl.; formula No. 1, special, 190 proof, in drums, 40c. Ethyl spirits, U.S.P., 190 proof, $4.75@$4.77 per gal., bbl. included. The market for methanol underwent no further changes. Producers offered 95 per cent material, carload lots, in drums, at 95c. per gal.; in cooperage the price held at $1.05 per gal. Production of methanol in July amounted to 645,673 gal., against 727,458 gal. in June.

Reorganization Plans of the American Cotton Oil Co.

The American Cotton Oil Co. has organized a new subsidiary, the Gold Dust Corporation, under the laws of New Jersey, with an authorized capital of $5,000,000 preferred stock and 325,000 shares no par common. It is understood this subsidiary will acquire from American Cotton Oil the soap end of the business, notably "Gold Dust" and "Fairy Soap." It has issued in exchange its preferred stock and a part of its common to be held by the American Cotton Oil Co.

It is reported that a plan will shortly be presented to stockholders giving them the opportunity to exchange their stock for stock of the Gold Dust Corporation on the basis of one share of Cotton Oil preferred for one share of Gold Dust common and three shares Cotton Oil common for one share Gold Dust common.

Coal-Tar Products

Buying Movement Not Up to Normal—Offerings of Benzene Liberal —Phenol for Shipment Irregular

THE volume of business placed in the market for coal-tar products was disappointing. Inquiry from intermediates was better, but most of the call was for immediate and nearby shipment material. Large consumers were not favorably impressed by prices asked on deferred shipments, especially in phenol and benzene. Production of crudes continues at a healthy rate and prices presented a rather unsettled appearance. Export demand was slow. A canvass of the coke industry by the Geological Survey reveals that production in 1922 amounted to 37,124,012 tons, of which total 28,550,545 tons was produced by the byproduct ovens. With the exception of 1920 the production of coke in the byproduct ovens was the largest on record. The value of coal-tar chemicals imported into the United States for the 7 months ended with July was $9,583,989, against $6,104,665 for the corresponding period a year ago. Export trade in coal-tar chemicals also increased, the value for the 7 months ended with July being $8,238,-853, which compares with $4,673,306 a year ago.

Aniline Oil and Salt—Exports of aniline oil and salt for the 7 months ended with July amounted to 418,616 lb., against 302,335 lb. for the corresponding period a year ago. The market was a quiet affair, but producers continued to hold out for 16c. per lb. on the oil and 23c. per lb. on the salt, prompt shipment from works.

Benzene—The market for benzene underwent quite a reduction in the past week. Offerings were liberal and prices were unsettled, covering a range of fully 4c. per gal., depending upon the seller and delivery. Export demand was routine only. Continental buyers have been in a position to operate on a more favorable basis in the English markets. Exports of benzene from the United States for the 7 months ended with July amounted to 81,393,609 lb., which compares with 52,202,554 lb. for the corresponding period a year ago. The market was lower at 22@23c. per gal. on the 90 per cent grade, tank car basis, f.o.b. point of production. The pure was offered by leading interests at 24@26c. per gal., tank car basis.

Creosote—Official statistics show that 4,894,108 gal. of dead or creosote oil arrived at United States ports during the month of July, comparing with 3,898,528 gal. for the same month a year ago. Imports for the 7 months ended with July amounted to 35,378,055 gal., valued at $5,369,149. This compares with 24,393,947 gal., valued at $2,520,986, for the 7 months ended with July in 1922. Cables from Manchester reported that the market there was unchanged at 8½@8¾d. per gal., bulk basis works.

Cresylic Acid—Competition for business was keen and the larger stocks tend to unsettle prices. Quotations heard ranged all the way from 65@85c. per gal., as to quality, seller and delivery.

Naphthalene—Demand was dull and prices irregular. Flake on spot held at 6¾@7c. per lb., with nearby material available at concessions. Chips were offered at less than 5c. per lb., nearby positions, carload basis. Crude for shipment from the other side was nominally unchanged around 2½c. per lb. The firmer position of exchange had a tendency to steady the views of traders in English naphthalene for shipment. Importations for the 7 months ended with July, according to official information, amounted to 14,552,574 lb., which compares with 1,565,501 lb. for the corresponding period a year ago.

Paranitraniline—Scattered business was reported at 72c. per lb. The market was steady in most quarters and several handlers continued to quote up to 75c. per lb.

Phenol—Spot quotations on U.S.P. phenol were unchanged at 28@30c. per lb. Demand was inactive and the undertone rather easy. On futures it was possible to shade the inside figure without difficulty, as some producers appeared anxious to get business on the books for 1924 delivery. It was intimated that on round-lot transactions covering first-half of 1924 delivery sellers stood ready to consider bids around 22½c. per lb.

Pyridine—Offerings were scanty and the market was wholly nominal. Foreign material was offered at $4.25@ $4.75 per gal., the inside figure obtaining on nearby deliveries. Domestic producers are sold up. The output here is being increased so as to meet the growing demand.

Solvent Naphtha—Production is well taken care of by existing contracts and prices named are little more than nominal. Water-white is quoted around 27c. per gal., bulk basis, f.o.b. works.

New Glass Factory in Rumania

A new glass factory at Constantza, Rumania, has just started working. While it is not yet completed, only four ovens being used, with one master glass blower and two assistants to an oven, it is expected that fourteen ovens will be working in a short time, each one heated by compressed air to over 1,000 deg. C. Besides the blow ovens, there are special ovens heated to 400 deg. C. in order to cool slowly the blown glass, thus reducing its friability. From the cooling process the glass goes to the cutler and finisher, while the floor above is used for assembling and packing.

Radium Deposit Found

A large deposit of radium is reported found in Turkestan. Announcement to this effect has recently come from Petrograd, the discovery having been made by members of the Russian Radium Institute.

Dr. C. Everett Field, president of the Radium Research Corporation and the Radium Institute, at 323 Riverside Drive, New York City, declared the discovery of this deposit would be of tremendous advantage to science and to persons suffering from malignant growths.

The supply of radium was estimated last July at 8 oz., of which the United States had probably little more than 3 oz., Dr. Field said. The contribution of America's mines to this total, he said, was about 3½ oz., the carnotite ores of Colorado supplying most of it.

When the discovery of radium-bearing ore in the Belgian Congo in Africa was announced last fall, Dr. Field said the price fell from $110,000 a gram to about $75,000, and he predicted another decrease as a result of the new find.

Latest Quotations on Industrial Stocks

	Last Week	This Week
Air Reduction	65	66½
Allied Chem. & Dye	68	65¾
Allied Chem. & Dye pfd	108	109
Am. Ag. Chem.	16¼	15
Am. Ag. Chem. pfd	41	38
American Cotton Oil	7⅜	6¼
American Cotton Oil pfd	24⅜	20
American Cyanamid	61¼	69
Am. Drug Synd.	4⅝	4¼
Am. Linseed Co.	20¼	20⅜
Am. Linseed pfd	39	40
Am. Smelting & Refining Co.	58¼	58⅛
Am. Smelting & Refining pfd.	97	97
Archer-Daniels Mid. Co., w.i.	27	26
Archer-Daniels Mid. Co., pfd.	90	91
Atlas Powder	55⅜	54
Casein Co. of Am.	*62	*62
Certain-Teed Products	*30	*30
Commercial Solvents "A"	33	*31
Corn Products	128⅜	125
Corn Products pfd.	117¼	119
Davison Chem.	49	49¼
Dow Chem. Co.	*45	*45
Du Pont de Nemours	134½	132¼
Du Pont de Nemours db.	85	87
Freeport-Texas Sulphur	14¼	15⅛
Glidden Co.	*8	*9
Grasselli Chem.	*132	*132
Grasselli Chem. pfd.	105	*105
Hercules Powder	110	110
Hercules Powder pfd.	107	107
Heyden Chem.	*1⅞	1¼
Int'l Ag. Chem. Co.	4	*3
Int'l Ag. Chem. pfd.	12¼	10
Int'l Nickel	13	12¾
Int'l Nickel pfd.	79	78
Int'l Salt	*89½	*89½
Mathieson Alkali	43	41
Merck & Co.	78	78
National Lead	126½	125
National Lead pfd.	113½	112⅜
New Jersey Zinc	152	152
Parke, Davis & Co.	78½	78
Pennsylvania Salt	*81	*81
Procter & Gamble	128	*128
Sherwin-Williams	28⅜	32
Sherwin-Williams pfd.	102	102
Tenn. Copper & Chem.	9½	9⅜
Texas Gulf Sulphur	57⅝	56¼
Union Carbide	57	55
United Drug	80	79½
United Dyewood	44⅜	*45
U. S. Industrial Alcohol	54⅜	52⅜
U. S. Industrial Alcohol pfd.	*100	*100
Va.-Car. Chem. Co.	12½	10⅜
Va.-Car. Chem. pfd.	33	29½

*Nominal. Other quotations based on last sale.

Vegetable Oils and Fats

Higher Prices for Cottonseed, Corn, Soya and Palm Oils —Linseeed Steady—Tallow Advances

NON-DRYING oils continued to advance under a good buying movement. Supplies available for prompt shipment were light and traders regarded the outlook as favoring sellers for the next 30 days at least. The ginnings report revealed an early and heavy movement of cotton in Texas, but as a market factor this was offset by the unfavorable news from other sections of the cotton belt. The feature in the linseed oil situation was the favorable September 1 report on the condition of the flaxseed crop. Recent importations of crude soya bean oil in bulk from Dairen were resold to the Continent. Soap makers took on round lots of palm oil. Tallow sold at higher prices.

Cottonseed Oil—Prices for both crude and refined cottonseed oil established new highs for the movement. The offerings of crude for nearby delivery were scanty and with packers as well as refiners short of supplies the active buying sent prices sharply higher. Crude oil for prompt shipment actually sold up to 10½c. per lb., buyers' tanks, f.o.b. mills Southeast, and at 10¼c. per lb., buyers' tanks, f.o.b. mills Texas common points. Late in the week the undertone was not so firm on realizing in the option market, and late September shipment crude could have been secured at 10c. per lb., f.o.b. Texas. It was estimated that fully 150 tank cars of crude oil sold during the week for prompt and nearby shipment from Southern points at prices ranging from 9½@10¼c. The cotton situation did not change much one way or the other, but the large ginnings in Texas was generally regarded as a bearish development. There was some good selling of December and March refined oil in the option market. Bleachable oil was in demand, but business was limited because of the dearth in offerings. Sales of bleachable went through at 11¼c. per lb., buyers' tanks, f.o.b. Texas common points. Lard compound was in good demand and prices advanced to 13@13½c. per lb. Lard was unsettled in the West on profit taking.

Linseed Oil—According to the September 1 report of the Department of Agriculture the flaxseed crop in the Northwest did well during the month of August. The yield per acre was raised to 8.5 bu., against 8.3 bu. a month ago and 7.9 bu. on July 1. The estimated production was brought up to 19,400,000 bu., as against 19,100,000 bu. a month ago and 12,238,000 bu. in the final estimate for 1922. Nevertheless, the seed markets ruled firm. Reports of damaging frost in the flaxseed belt were not taken seriously. There was some concern over the condition of the Canadian crop. Receipts of new crop seed have increased and Minneapolis oil mills were in a position to compete with New York mills for business, a situation that has not been witnessed in more than a year. News from the Argentine was favorable. Demand for linseed oil was fair. Consumers are not buying far ahead. Spot oil was firmer in some quarters. September delivery oil, in cooperage, carload lots, closed at 88@90c. per gal., as to seller. October shipment oil settled at 85@86c. per gal., with November-December at 83@84c. per gal. January-February-March oil was offered at 80@81c. per gal.. cooperage basis. Early in the week several tank cars of October shipment oil sold at 80c. per gal., equal to 85c. in cooperage.

China Wood Oil — Receipts were larger and this unsettled the spot market. Business was put through in a moderate way at 21@22c. per lb., immediate delivery. On futures the undertone was steady. China reported light stocks and in some directions it was thought that the market on futures was oversold. On the Pacific coast prompt shipment oil in tank cars was offered at 19½@20c. per lb. Futures closed at 20@21c. per lb., tank car basis.

Coconut Oil—Several tank cars of Ceylon type oil sold for nearby shipment from the coast at 8¼c. per lb., indicating that prices underwent no change during the week. In New York there were offerings at 8¾c. per lb., tank car basis. The undertone was steady in sympathy with copra. Demand has fallen off at the prices now prevailing. Manila oil was offered for shipment at 8¼c. per lb., bulk basis, c.i.f. Pacific coast. Copra held around 5c. per lb. c.i.f. Pacific coast ports.

Corn Oil—There were sales of crude corn oil for September shipment at 9¾c. per lb., f.o.b. mills, an advance of ¾c. per lb. Towards the close 10c. was asked. Offerings were light.

Palm Oils—Soap makers have been heavy buyers of palm oils. With tallow higher sellers' views remain firm. Niger oil on spot sold at 7¼c. per lb., while this same grade was purchased for future delivery at the same price. Lagos oil was advanced to 7⅝@7¾c. per lb., c.i.f. New York.

Soya Bean Oil—More than 1,000 tons of bulk oil sold for prompt shipment to Rotterdam. This oil arrived here about a week ago, but found no takers. Prompt oil in sellers' tanks, duty paid, did sell at 9¼c. per lb., an advance of ¼c.

Menhaden Oil—Fishing was good, but strength in competing oils steadied the market. Sales of crude oil went through at 42½c. per gal., tank cars, f.o.b. Baltimore, an advance of 2½c.

Tallow, etc.—Extra tallow sold at 8¼c. per lb., which compares with 7¼c. a week ago. The market was firm on active buying for soapers. Offerings after the advance increased. Yellow grease was raised to 7¾c. per lb. Oleo stearine sold at 12¾c. per lb., a gain of ¾c. for the week.

Miscellaneous Materials

Antimony—Market steady. Chinese and Japanese brands 7½@7¾c. per lb. Chinese needle, lump, 5½c. per lb. White oxide, 99 per cent, 7¾@8c. per lb.

Barytes—Demand has been less urgent, but so far as prices are concerned the market is steady. Crude held at $7@$10 per ton. White floated is selling at $28@$30 per ton, f.o.b. St. Louis. Arrivals of foreign goods have been larger.

Casein — There are sellers of imported material at 14@15c. per lb., immediate delivery. Domestic casein is nominally unchanged at 15@17c. per lb., as to quantity and seller.

Chalk — Trading continued along routine lines. English chalk was offered for shipment at $5.50 per ton, c.i.f. New York cargo basis.

Glycerine — Chemically pure was barely steady at 17@17¼c. per lb., in drums. Competition among refiners was keen. Dynamite sold at 16c. per lb., carload lots, with bids at this figure towards the close. Crude soap-lye glycerine settled at 11@11¼c. per lb., loose, carload basis. Saponification, loose, was nominal at 12½@12¾c. per lb.

Naval Stores—Trading inactive, but prices firmer on stronger views in the South. Spirits turpentine was advanced to 99c. per gal., a net gain of 4c. for the week. Rosins were quotably unchanged on the basis of $5.75 per bbl. for the lower grades. Export call was inactive.

Shellac—Firmer cables from Calcutta and improved demand locally sent prices from 2@3c. per lb. higher. The strength abroad was attributed to covering by shorts. T.N. closed here at 61@62c. per lb. Bleached, bonedry, settled at 72@73c. Superfine orange, spot, 64@65c. per lb.

White Lead—With no change of importance in the pig lead situation and a seasonal call for the finished products, corroders reported the market as steady. Standard dry white lead (basic carbonate) held at 9¼c. per lb., in casks, carload lots. Red lead, dry, closed unchanged at 10¼@10½c. per lb. Litharge, commercial, in casks, 10⅜c. per lb., carload basis.

Zinc Oxide—With the rubber tire industry operating at 60 per cent capacity producers of zinc oxide do not look for any important buying for the near future. Basic materials have been steady and this accounts for the unchanged condition of the market for oxide. American process, lead free, held at 8@8½c. per lb. The leaded grades ranged in price from 7@7½c., carload basis. French process oxide, red seal, was offered at 9¾c. per lb.

Imports at the Port of New York

September 7 to September 13

ACIDS—Stearic—20 cs., Rotterdam, W. Parsons & Plymouth Organic Lab.

ALPHA-NAPHTHYLAMINE — 13 bbl., Yokohoma, Shima Trading Co.

AMMONIUM BIFLUORIDE — 10 keg, Bremen, Pfaltz & Bauer.

AMMONIUM NITRATE — 2,081 csk., Hamburg, Kuttroff, Pickhardt & Co.

ANTIMONY REGULUS—500 cs., Shanghai, Norton, Lilly & Co.; 480 cs., Hankow, Asia Banking Corp.; 750 cs., Hankow, Order; 350 cs., Hankow, Sinoava Handelver.

ANTIMONY OXIDE—1,000 bg., Hankow, Order; 500 bg., Shanghai, Wah Chang Trading Corp.

ALCOHOL — 210 csk. butyl, Bordeaux, Commercial Solvents Co.; 150 bbl. denatured, Orecibo, C. Esteva.

ALBUMEN—30 cs., Hankow, Stein, Hall & Co.; 56 cs., Hankow, Bingham & Co.; 56 cs., Hankow, Wah Chang Trading Corp.; 572 cs., Shanghai, Jardine, Matheson & Co.

ARSENIC — 250 cs., Tokio, Chipman Chemical & Engineering Co.; 100 cs., Tokio, G. F. Taylor & Co.; 230 csk., Shanghai, Wah Chang Trading Corp.; 100 cs., Yokohama, Corn Exchange Bank; 100 csk., Hamburg, Ore & Chemical Corp.; 116 bbl., Tampico, American Smelting & Refining Co.; 180 bbl., Tampico, American Metal Corp.

ASBESTOS — 3,696 bg., Beira, W. D. Crumpton.

BARIUM CARBONATE—43 csk., Hamburg, Order.

BARYTES—400 bg., Bremerhaven, New York Trust Co.; 200 bg., Bremerhaven, L. H. Butcher & Co; 1,000 bg., Seville, Order.

BARIUM NITRATE—60 bbl., Hamburg, Unexcelled Mfg. Co.

BRONZE COLOR—45 cs., Bremerhaven, Baer Bros.; 20 cs., Bremerhaven, Gerstendorfer Bros.; 23 pkg., Bremerhaven, Uhlfelder & Co.

CAMPHOR—300 cs., Shanghai, Suzuki & Co.; 84 cs., Shanghai, D. L. Moss & Co.; 84 cs., Shanghai, Hetherman & Co.; 50 cs., Shanghai, Mitsui & Co.; 300 cs., Shanghai, Suzuki & Co.

CASEIN — 290 bg., St. Nazaire, E. B. Muns; 201 bg, St. Nazaire, National City Bank.

CHALK — 715 tons, Dunkirk, Taintor Trading Co.; 1,500 bg. Antwerp, Bankers Trust Co.; 2,174 bg., Havre, Thac Industrial Products Corp.; Quantity in bulk, Dunkirk, Kidder, Peabody & Co.; 240 bg., London, Brown Bros. & Co.

CHEMICALS—30 bbl., Hamburg, Roessler & Hasslacher Chemical Co.; 384 pkg., Hamburg, Jungmann & Co.; 24 cs., Bremerhaven, Pfaltz & Bauer; 92 dr., Hamburg, A. Kramer & Co.; 45 csk., Hamburg, C. B. Richard & Co.; 250 sk., Hamburg, Roessler & Hasslacher Chem. Co.; 2 cs., Hamburg, Merck & Co.; 650 bg., Glasgow, Brown Bros. & Co.; 336 bg., Glasgow, Bankers Trust Co.; 20 dr., Hull, A. Penchot, Inc.; 43 bbl., Hamburg, Roessler & Hasslacher Chem. Co.; 7 bbl. Hamburg, Hummel & Robinson Corp.; 101 bg., Gothenburg, Roessler & Hassiacher Chemical Co.

CHROME ORE—394 tons, Beira, Asia Banking Corp.

CINCHONINE—10 cs., Rotterdam, R. W. Greeff & Co.

CITRATE MAGNESIUM—300 cs., Genoa, Order.

COAL-TAR DISTILLATE—86 dr., Liverpool, Monsanto Chemical Works.

COLORS—8 bbl. aniline, Genoa, Irving Bank-Col. Trust Co.; 6 bbl. do., Genoa, Bank of the Manhattan Co.; 71 csk. earth, Bremen, Heller & Merz; 43 csk. do., Bremen, Fezandie & Sperrle; 2 csk. aniline, Havre, Carbic Color & Chemical Co.; 102 pkg. aniline, Shanghai, National Aniline & Chemical Co.; 19 csk., Hamburg, Bernard, Judae & Co.; 150 csk., Havre, Heemsoth Basse Co.; 15 csk. aniline, Havre, Ciba Co.; 4 csk. do., Havre, Carbic Color & Chem. Co., 36 csk. do., Havre, Order; 4 cs. aniline, Genoa, B. Bernard, Inc.; 11 csk. aniline, Genoa, Ackerman Color Co.; 9 csk. aniline, Hamburg, Franklin Import & Export Co.; 12 csk. aniline, Rotterdam, H. A. Metz & Co.; 23 bbl. do., Genoa, Irving Bank-Col. Trust Co.; 10 csk. aniline, Genoa, Order; 48 cs. umber, Hull, L. H. Butcher & Co.

CORUNDUM ORE—2,524 bg., Durban, Hampden Grinding Wheel Corp.; 596 bg., Durban, Order; 729 bg., Delagoa Bay, Standard Bank of South Africa.

CREAM TARTAR — 50 csk., Hamburg, Guaranty Trust Co.; 200 csk., Rotterdam, Holland Food Corp.

DYESTUFFS—15 csk., Genoa, Bernard Bernard, Inc.; 15 csk. aniline, Antwerp, Geigy Co., Inc.; 3 keg, London, Order.

EPSOM SALT—200 csk., Hamburg, Fidelity International Trust Co.; 1,600 bg., Hamburg, Superfos Co.; 200 bbl., Gothenburg, Order.

FERROCHROME—28 csk., Gothenburg, D. Heydemann & Co.

FUSEL OIL—27 dr., Dunkirk, Order; 12 dr., Rotterdam, Order; 1 dr., Antwerp, Order.

GLAUBER SALT—85 bbl. and 25 bg., Hamburg, A. J. Marcus, Inc.

GAMBIER — 425 cs., Asahan, Arbuthnot, Latham & Co.; 425 cs., Asahan, Order.

GUMS—68 bg. copal, London, Chemical National Bank; 20 cs. tragacanth, Southampton, Order; 283 pkg. kauri, Auckland, Brown Bros. & Co.; 10 cs. kauri, Auckland, Order; 393 pkg. kauri, Auckland, Chemical National Bank; 32 sk. kauri, Auckland, Bank of Montreal; 729 cs. do., Auckland, J. D. Lewis; 601 sk. do., Auckland, Am. Foreign Banking Corp.; 51 cs. do., Auckland, Equitable Trust Co.; 355 cs. and 394 sk., Auckland, Order; 74 bg. tragacanth, Hamburg, Brown Bros. & Co.; 1,000 bg. copal, Antwerp, Order; 25 cs. benjamin, Penang, D. L. Silverman; 170 sk. copal, Manila, Order; 150 bg. arabic, Port Sudan, Caracanda Bros.; 100 bg. arabic, Port Sudan, Anglo Egyptian Bank; 122 bg. copal, Lonlon, Winterbourne & Co.; 294 cs. kauri, Auckland, Standard Bank of South Africa; 467 pkg. kauri, Auckland, Guaranty Trust Co.; 792 pkg. do., Auckland, Baring Bros. & Co.; 203 pkg. do., Auckland, Order; 320 bg. copal, Antwerp, Equitable Trust Co.; 500 cs. damar, Batavia, Order; 2,152 pkg. copal and 650 bskt. damar, Macassar, Order; 394 bskt. damar, Wajaboda, Order.

GRAPHITE—900 csk. amorphous, Moji, G. F. Pettinos.

GLYCERINE—40 csk., Bordeaux, Order.

HEMATINE CRYSTALS—19 bbl., Cape Haitian, Logwood Mfg. Co.

IRON OXIDE—4 cs., Barcelona, J. M. Rabassa; 185 csk., Dundee, Order.

LOGWOOD EXTRACT—5 csk. Havre Order; 220 bbl., Cape Haitian, Logwood Mfg. Co.

LITHOPONE—240 csk., Rotterdam, Order; 120 csk., Antwerp, E. M. & F. Waldo; 200 csk., Antwerp, A. Klipstein & Co.

MAGNESITE—313 bg., Rotterdam, Speiden, Whitfield Co.; 1,000 bg. calcined, Rotterdam, Innis, Speiden & Co; 9,000 bg., Madras, Order; 170 pkg., Rotterdam, A. Kramer & Co.

MAGNESIUM CHLORIDE—31 dr., Hamburg, A. Kramer & Co.; 300 bbl., Hamburg, Speiden, Whitfield & Co.

MANGROVE BARK — 685 bg., Beira, Order.

MANGANESE—20 keg, Bremerhaven, Pfaltz & Bauer.

MYROBALANS — 7,790 pkt., Calcutta, National City Bank.

MENTHAL—10 cs., Kobe, Iwai & Co.; 30 cs., Kobe, Equitable Trust Co.; 10 cs., Kobe, Dodwell & Co.; 10 cs., Kobe, Iwai & Co.; 10 cs., Yokohama, Order.

MINERAL WHITE — 1,200 bg., Hull, Hammill & Gillespie.

OCHRE—893 csk., Marseilles, Reichard-Coulston, Inc.; 197 csk., Marseilles, Order.

OILS—Cod—137 csk., St. Johns, National Oil Products Co.; 50 csk., St. Johns, Order. **China Wood**—1,827 csk., Hankow, Bank of the Manhattan Co.; 152 csk., Hankow, Standard Bank of South Africa; 285 csk., Hankow, Irving Bank-Col. Trust Co.; 607 csk., Hankow, Jardine, Matheson & Co.; 185 bbl., Hankow, Viele, Clackwell & Buck; 1,185 bbl., Hankow, Order; 144 csk., Hankow, A. Klipstein & Co.; 339 csk., Gothenburg, Order. **Cocoanut**—Quantity in bulk, Manila, Spencer Kellogg & Sons. **Olive Oil Foots**—300 bbl., Bari, Order; 300 bbl., Monopoli, Leghorn Trading Co.; 100 bbl., Seville, National City Bank; 500 bbl., Seville, Bank of the Manhattan Co.; 418 bbl., Seville, Equitable Trust Co., 150 bbl., Seville, Chemical National Bank; 1,400 bbl., Seville, Order. **Palm**—309 csk., Cotonou, Bank Francaise de L'Afrique Equatorial; 15 csk., Cotonou, A. D. Strauss & Co.; 254 csk., Rotterdam, African & Eastern Trading Co. **Rapeseed**—425 bbl., Hull, Balfour, Williamson & Co.

OIL SEEDS—Castor—138 bg., St. Vincent, Saffern Trading Co.; 23,765 bg., Cocanada, Order. **Linseed**—2,190 bg., Buenos Aires, L. Dreyfus & Co.; 3,879 bg., Buenos Aires, Order.

PITCH—50 bbl., London, Order; 5 csk., Hull, Arcos, Ltd.

POTASSIUM SALTS— 999 bg. sulphate, Hamburg, Potash Importing Corp. of America; 2,000 bbl. chlorate, Hamburg, Irving Bank-Col. Trust Co.; 10 csk. prussiate, Liverpool, Order.

PLUMBAGO—100 bbl., Colombo, H. W. Peabody & Co.; 125 bbl., Colombo, Order; 150 bbl., Colombo, New York Trust Co.

QUEBRACHO — 18,182 pcs., Santa Fe, Fannin Corp.

SALAMMONIAC — 78 csk., Hamburg, Phillip Bauer Co.

SHELLAC—35 bg. garnet lac, Hamburg, Kasebier, Chatfield Shellac Co.; 629 bg., Southampton, Order; 100 cs., Calcutta, Brown Bros. & Co.; 2,697 bg. and 138 chests, Calcutta, Order; 31 cs., Rotterdam, C. F. Gerlach & Co.; 5 cs., Penang, D. L. Silverman; 100 bg., London, Rald Bros., 400 bg., London, Order; 45 bg. garnet, Hamburg, Kasebier-Chatfield Shellac Co.

SODIUM SALTS — 100 csk. perborate, Hamburg, Equitable Trust Co.; 250 csk. nitrate, Hamburg, Kuttroff, Pickardt & Co.; 5,773 bg. nitrate, Iquique, Wessel, Duval & Co.; 5,627 bg. nitrate, Iquique, Du Pont de Nemours & Co.; 200 bg. silico fluoride, Rotterdam, Order; 398 csk. hyposulphite, Marseilles, E. Suter & Co.; 1,885 bg. nitrate, Antofagasta, W. R. Grace & Co.; 9,962 bg. nitrate, Iquique, W. R. Grace & Co.; 405 dr. sulphite, Hamburg, C. S. Grant & Co.

STARCH — 500 bg. potato, Rotterdam, Chatham & Phenix National Bank; 800 bg. potato, Rotterdam, Order.

SULPHUR PRECIPITATE—10 cs., Bremerhaven, Pfaltz & Bauer.

SUMAC — 15 csk. extract, Glasgow, American Dyewood Co.

TALC—200 bg., Bordeaux, C. B. Chrystal Co.; 300 bg., Bordeaux, Whittaker, Clark & Co.; 1,900 bg., Bordeaux, L. A. Salomon; 800 bg., Bordeaux, Moore & Munger; 650 bg., Bordeaux, Whittaker, Clark & Daniels; 500 bg., Bordeaux, Hammill & Gillespie; 230 bg., Bordeaux, Order.

TANNIN—17 csk., Antwerp, Geigy Co., Inc.

TARTAR—313 bg., Seville, C. Pfizer & Co.; 240 bg., Borbeaux, Tartar Chemical Co.; 91 bg., Bordeaux, C. Pfizer & Co.; 171 bg., Marseilles, Royal Baking Powder Co.; 281 bg., Marseilles, C. Pfizer & Co.

TAR OIL—5 bbl., Hamburg, West Disinfecting Corp.

VENETIAN RED—150 csk., Liverpool, J. Lee Smith.

WAXES—50 cs. bees, Hamburg, Innis, Speiden & Co.; 60 bg. do., Hamburg, Guaranty Trust Co.; 47 pkg. bees, Havana, Order; 101 bg., San Antonio, National City Bank.

WATTLE BARK—1,541 bg., Durban, E. J. Haley, Inc.; 4,315 bg., Durban, Hammond, Carpenter Co.; 1,245 bg., Durban, J. C. Anderson & Co.

WOOL GREASE—50 bbl., Liverpool, Mechanics & Metals National Bank; 71 pkg., London, Order; 90 bbl., Antwerp, Order.

ZINC OXIDE—33 csk., Liverpool, L. H. Butcher & Co.; 100 csk., Marseilles, Order.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums	lb.	$0 25 –	$0.25½
Acid, acetic, 28%, bbl.	100 lb.	3.38 –	3.50
Acetic, 56%, bbl.	100 lb.	6.75 –	7.00
Acetic, 80%, bbl.	100 lb.	9.58 –	9.83
Glacial, 99½%, bbl.	100 lb.	12.00 –	12.78
Acetic anhydride, 85%, dr.	lb.	.38 –	....
Boric, bbl.	lb.	.10 –	....
Citric, kegs	lb.	.49 –	.50
Formic, 85%	lb.	.12 –	.14
Gallic, tech.	lb.	.45 –	.50
Hydrofluoric, 52%, carboys	lb.	.11 –	.12
Lactic, 44%, tech., light, bbl.	lb.	.11½ –	.12
22% tech., light, bbl.	lb.	.05½ –	.06
Muriatic, 18° tanks	100 lb.	.90 –	1.00
Muriatic, 20°, tanks	100 lb.	1.00 –	1.10
Nitric, 36°, carboys	lb.	.04½ –	.05
Nitric, 42°, carboys	lb.	.06 –	.06½
Oleum, 20%, tanks	ton	18.50 –	19.00
Oxalic, crystals, bbl.	lb.	.12 –	.12½
Phosphoric, 50% carboys	lb.	.07½ –	.08½
Pyrogallic, resublimed	lb.	1.50 –	1.60
Sulphuric, 60°, tanks	ton	9.00 –	11.00
Sulphuric, 60°, drums	ton	13.00 –	14.00
Sulphuric, 66°, tanks	ton	15.00 –	16.00
Sulphuric, 66° drums	ton	20.00 –	21.00
Tannic, U.S.P., bbl.	lb.	.65 –	.70
Tannic, tech., bbl.	lb.	.45 –	.50
Tartaric, imp., powd., bbl.	lb.	.32 –	.33
Tartaric, domestic, bbl.	lb.	.36 –	....
Tungstic, per lb.	lb.	1.10 –	1.20
Alcohol, butyl, drums, f.o.b. works	lb.	.26 –	.28
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.78 –	....
Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.75 –	....
Alcohol, methyl (see Methanol)			
Alcohol, denatured, 190 proof			
No. 1, special bbl.	gal.	.46 –	....
No. 1, 190 proof, special, dr.	gal.	.40 –	....
No. 1, 188 proof, bbl.	gal.	.47 –	....
No. 1, 188 proof, dr.	gal.	.41 –	....
No. 5, 188 proof, bbl.	gal.	.45 –	....
No 5, 188 proof, dr.	gal.	.39 –	....
Alum, ammonia, lump, bbl.	lb.	.03½ –	.04
Potash, lump, bbl.	lb.	.03 –	.04½
Chrome, lump, potash, bbl.	lb.	.06 –	.07
Aluminum sulphate, com., bags	100 lb.	1.40 –	1.50
Iron free bags	100 lb.	2.40 –	2.50
Aqua ammonia, 26°, drums	lb.	.07 –	.07½
Ammonia, anhydrous, cyl.	lb.	.30 –	.30½
Ammonium carbonate, powd. casks, imported	lb.	.09½ –	.10
Ammonium carbonate, powd. domestic, bbl.	lb.	.13 –	.14
Ammonium nitrate, tech., casks	lb.	.10 –	.11
Amyl acetate tech., drums	gal.	4.50 –	4.75
Antimony Sulphuret, golden	lb.	.19 –	.20
Arsenic, white, powd., bbl.	lb.	.10½ –	.11
Arsenic, red, powd., kegs	lb.	.15 –	.15½
Barium carbonate, bbl.	ton	68.00 –	70.00
Barium chloride, bbl.	ton	80 00 –	88.00
Barium dioxide, drums	lb.	.18 –	.18½
Barium nitrate, casks		.07¾ –	.08
Blanc fixe, dry, bbl.	lb.	.04 –	.04½
Bleaching powder, f.o.b. wks., drums	100 lb.	1.50 –	1.75
Spot N. Y. drums	100 lb.	2.00 –	2.10
Borax, bbl.	lb.	.05½ –	.05½
Bromine, cases	lb.	.28 –	.30
Calcium acetate, bags	100 lb.	4.00 –	4.05
Calcium arsenate, dr.	lb.	.13 –	.14
Calcium carbide, drums	lb.	.05½ –	.05½
Calcium chloride, fused, dr. wks.	ton	21.00 –	....
Gran. drums works	ton	27.00 –	....
Calcium phosphate, mono, bbl.	lb.	.06½ –	.07
Camphor, cases	lb.	.87 –	.89
Carbon bisulphide, drums	lb.	.07 –	.07½
Carbon tetrachloride, drums	lb.	.09 –	.09½
Chalk, precip.—domestic, light, bbl.	lb.	.04½ –	.04½
Domestic, heavy, bbl.	lb.	.03½ –	.03½
Imported, light, bbl.	lb.	.04½ –	.05
Chlorine, liquid, tanks, wks.	lb.	.05½ –	.05½
Cylinders, 100 lb., wks	lb.	.06 –	.06½
Cylinders, 100 lb., spot	lb.	.09 –	....
Chloroform, tech., drums	lb.	.28 –	.32
Cobalt oxide, bbl.	lb.	2.10 –	2.25
Copperas, bulk, f.o.b. wks.	ton	20.00 –	21.00
Copper carbonate, bbl.	lb.	.18 –	.19
Copper cyanide, drums	lb.	.47 –	.50
Coppersulphate, dom., bbl.,	100 lb.	5.10 –	5.25
Imp. bbl.	100 lb.	4.75 –	....
Cream of tartar, bbl.	lb.	.24½ –	.26
Epsom salt, dom., tech., bbl.	100 lb.	1.75 –	2.00
Epsom salt, imp., tech., bags	100 lb.	.90 –	1.00
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.25 –	2.50
Ether, U.S.P., resale, dr.	lb.	.13 –	.15
Ethyl acetate, 85%, drums	gal.	.80 –	.81
Ethyl acetate, ether, 98% to 100%	gal.	$0 95 –	$1.00
Formaldehyde, 40%, bbl.	lb.	.13 –	.13½
Fullers earth—imp., powd., net	ton	30.00 –	32.00
Fusel oil, ref., drums	gal.	.... –	....
Fusel oil, crude, drums	gal.	4.25 –	....
Glaubers salt, wks., bags	100 lb.	1.20 –	1.40
Glaubers salt, imp., bags	100 lb.	.90 –	.95
Glycerine, c.p., drums extra	lb.	.17 –	.17½
Glycerine, dynamite, drums	lb.	.16 –	.16¼
Glycerine, crude 80%, loose	lb.	.11 –	....
Iron oxide, red, casks	lb.	.12 –	.18
Lead:			
White, basic carbonate, dry, casks	lb.	.09¾ –	.09½
White, basic sulphate, casks	lb.	.08¾ –	.09
White, in oil, kegs	lb.	.11½ –	.11½
Red, dry, casks	lb.	.10½ –	.10½
Red, in oil, kegs	lb.	.13 –	.14½
Lead acetate, white crys., bbl.	lb.	.14 –	.14½
Brown, broken, casks	lb.	.13 –	.13½
Lead arsenate, powd., bbl.	lb.	.18 –	.20
Lime-Hydrated, bg, wks.	ton	10.50 –	12.50
Bbl., wks.	ton	18.00 –	19.00
Lime, Lump, bbl.	280 lb.	3.63 –	3.65
Litharge, comm., casks	lb.	.10¾ –	.10½
Lithophone, bags	lb.	.07 –	.07½
in bbl.	lb.	.07½ –	.07½
Magnesium carb., tech., bags	lb.	.08 –	.08½
Methanol, 95%, bbl.	gal.	1.05 –	....
Methanol, 97%, bbl.	gal.	1.07 –	....
Methyl-acetone, t'ks.	gal.	1.15 –	....
Nickel salt, double, bbl.	lb.	.10½ –	....
Nickel salts, single, bbl.	lb.	.11½ –	....
Phosgene		.60 –	.75
Phosphorus, red, cases	lb.	.... –	....
Phosphorus, yellow, cases	lb.	.35 –	.40
Potassium bichromate, casks	lb.	.09½ –	.10
Potassium bromide, gran., bbl.	lb.	.19 –	.20
Potassium carbonate, 80-85%, calcined, casks	lb.	.06½ –	.06¾
Potassium chlorate, powd.	lb.	.07 –	.08½
Potassium cyanide, drums	lb.	.47 –	.52
Potassium, first sorts, cask	lb.	.07¼	.08
Potassium hydroxide (caustic potash) drums	lb.	.07 –	.09
Potassium iodide, cases	lb.	3.65 –	3.75
Potassium nitrate, bbl.	lb.	.07½ –	.09
Potassium permanganate, drums	lb.	.17½ –	.17¾
Potassium prussiate, red, casks	lb.	.60 –	.63
Potassium prussiate, yellow, casks	lb.	.30 –	....
Salammoniac, white, gran., casks, imported	lb.	.06½ –	.06½
Salammoniac, white, gran., bbl., domestic	lb.	.07½ –	.07½
Gray, gran., casks	lb.	.08 –	.09
Salsoda, bbl.	100 lb.	1.20	1.40
Salt cake (bulk)	ton	26.00 –	28.00
Soda ash, light, 58% flat, bags, contract	100 lb.	1.45 –	1.50
Soda ash, light, 58%, flat, bags, resale	100 lb.	1.70 –	1.75
Soda ash, dense, bags, contract, basis 58%	100 lb.	1.51 –	....
Soda ash, dense, in bags, resale	100 lb.	1.85 –	1.90
Soda, caustic, 76%, solid, drums	100 lb.	3.16 –	....
Soda, caustic, ground and flake, contracts	100 lb.	3.60 –	3.85
Soda, caustic, solid, 76% f. a. s. N. Y.	100 lb.	3.15 –	3.25
Sodium acetate, works, bags	lb.	.05½ –	.05½
Sodium bicarbonate, bbl.	100 lb.	2.00 –	2.50
Sodium bichromate, casks	lb.	.07½ –	.07½
Sodium bisulphate (niter cake)	ton	6.00 –	7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04½ –	.04½
Sodium chlorate, kegs	lb.	.06½ –	.07
Sodium chloride	long ton	12.00 –	13.00
Sodium cyanide, cases	lb.	.19 –	.22½
Sodium fluoride, bbl.	lb.	$0 08½ –	$0.10½
Sodium hyposulphite, bbl.	lb.	.02½ –	.02½
Sodium nitrite, casks	lb.	.07½ –	.07½
Sodium peroxide, powd., cases	lb.	.28 –	.30
Sodium phosphate, dibasic, bbl.	lb.	.03½ –	.04
Sodium prussiate, yel. drums	lb.	.13½ –	.14
Sodium salicylic, drums	lb.	.40 –	.45
Sodium silicate (40°, drums)	100 lb.	.75 –	1.15
Sodium silicate (60°, drums)	100 lb.	1.75 –	2.00
Sodium sulphide, fused, 60-62% drums	lb.	.03 –	.04
Sodium sulphite, crys., bbl.	lb.	.03½ –	.03½
Strontium nitrate, powd., bbl.	lb.	.10 –	.11
Sulphur chloride, yel drums	lb.	.04½ –	.05
Sulphur, crude	ton	18.00 –	20.00
At mine, bulk	ton	16.00 –	18.00
Sulphur, flour, bag	100 lb.	2.25 –	2.35
Sulphur, roll, bag	100 lb.	2.00 –	2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 –	.08½
Tin bichloride, bbl.	lb.	.12 –	.12½
Tin oxide, bbl.	lb.	.45 –	....
Tin crystals, bbl.	lb.	.31½ –	.32
Zinc carbonate, bags	lb.	.14 –	.14½
Zinc chloride, gran, bbl.	lb.	.06½ –	.06½
Zinc cyanide, drums	lb.	.37 –	.38
Zinc oxide, , lead free, bbl.	lb.	.08 –	.08½
5% lead sulphate, bags	lb.	.07½ –	....
10 to 35 % lead sulphate, bags	lb.	.07 –	....
French, red seal, bags	lb.	.09½ –	....
French, green seal, bags	lb.	.10¼ –	....
French, white seal, bbl	lb.	.12 –	....
Zinc sulphate, bbl.	100 lb.	2.50 –	3.00

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0 60 –	$0.70
Alpha-naphthol, ref., bbl.	lb.	.65 –	.80
Alpha-naphthylamine, bbl.	lb.	.34 –	.36
Aniline oil, drums	lb.	.16 –	.16½
Aniline salts, bbl.	lb.	.22 –	.23
Anthracene, 80%, drums	lb.	.75 –	.80
Anthracene, 80%, imp., drums, duty paid	lb.	.65 –	.70
Anthraquinone, 25%, paste, drums	lb.	.80 –	.85
Benzaldehyde U.S.P., carboys	lb.	1.50 –	....
f.l.c. drums	lb.	1.60 –	....
tech, drums	lb	75	....
Benzene, pure, water-white, tanks and drums	gal.	.27 –	.32
Benzene, 90%, tanks & drums	gal.	.25 –	.30
Benzidine base, bbl.	lb.	.80 –	.85
Benzidine sulphate, bbl.	lb.	.75 –	....
Benzoic acid, U.S.P., kegs	lb.	.80 –	85
Benzoate of soda, U.S.P., bbl.	lb.	.65 –	70
Benzyl chloride, 95-97%, ref., drums	lb.	.45 –	....
Benzyl chloride, tech., drums	lb.	.30 –	.35
Beta-naphthol, tech., bbl.	lb.	.21 –	.22
Beta-naphthylamine, tech.	lb.	.75 –	.80
Cresol, U.S.P., drums	lb.	.25 –	29
Ortho-cresol, drums	lb.	.28 –	.32
Cresylic acid, 97%, works drums	gal.	.80 –	.85
95-97%, drums, works	gal.	.70 –	75
Dichlorbenzene, drums	lb.	.06 –	.08
Diethylaniline, drums	lb.	.50 –	.60
Dimethylaniline, drums	lb.	.41 –	.42
Dinitrobenzene, bbl.	lb.	.19 –	.20
Dinitrochlorbenzene, bbl.	lb.	.21 –	.22
Dinitronaphthalen, bbl.	lb.	.30 –	.32
Dinitrophenol, bbl.	lb.	.35 –	.40
Dinitrotoluen, bbl.	lb.	.20 –	.22
Dip oil, 25%, drums	gal.	.25 –	.30
Diphenylamine, bbl.	lb.	.50 –	.52
H-acid, bbl.	lb.	.75 –	.80
Meta-phenylenediamine, bbl.	lb.	1.00 –	1.05
Michlers ketone, bbl.	lb.	3.00 –	3.50
Monochlorbenzene, drums	lb.	.08 –	.10
Monoethylaniline, drums	lb.	.95 –	1.10
Naphthalene, flake, bbl.	lb.	.06½ –	.07
Naphthalene, balls, bbl.	lb.	.07½ –	.07½
Naphthionate of soda, bbl.	lb.	.58 –	.65
Naphthionic acid, crude, bbl.	lb.	.55 –	.60
Nitrobenzene, drums	lb.	.10 –	.12
Nitro-naphthalene, bbl.	lb.	.30 –	.35
Nitro-toluene, drums	lb.	.13½ –	.14½
N-W acid, bbl.	lb.	1.20 –	1.25
Ortho-amidophenol, kegs	lb.	2.30 –	2.35
Ortho-dichlorbenzene, drums	lb.	.15 –	.17
Ortho-nitrophenol, bbl.	lb.	1.20 –	1.30
Ortho-nitrotoluene, drums	lb.	.10 –	.12
Ortho-toluidine, bbl.	lb.	.18 –	.20
Para-amifiophenol, base, kegs	lb.	1.35 –	....
Para-amifiophenol, HCl, kegs	lb.	1.55 –	....
Para-dichlorbenzene, bbl.	lb.	.17 –	.20
Paranitroaniline, bbl.	lb.	.72 –	.74
Para-nitrotoluene, bbl.	lb.	.60 –	.65
Para-phenylenediamine, bbl.	lb.	1.45 –	1.50
Para-toluidine, bbl	lb.	.90 –	.95
Phthalic anhydride, bbl.	lb.	.35 –	.38
Phenol, U.S.P., dr.	lb.	.28 –	.30
Picric acid, bbl.	lb.	.20 –	.22
Pyridine, dom., drums	gal.	nominal	
Pyridine, imp., drums	gal.	4.50 –	5.00
Resorcinol, tech., kegs	lb.	1.40 –	1.50

Resorcinol, pure, kegs	lb.	$2.15 –	$2.25
R-salt, bbl.	lb.	.55 –	.60
Salicylic acid, tech., bbl.	lb.	.32 –	....
Salicylic acid, U.SP., bbl.	lb.	.35 –	....
Solvent naphtha, water-white, tanks	gal.	.27 –	....
Crude, tanks	gal.	.24 –	....
Sulphanilic acid, crude, bbl.	lb.	.18 –	.20
Thiocarbanilide, kegs	lb.	.35 –	.38
Tolidine, bbl	lb.	1.00 –	1.05
Toluidine, mixed, kegs	lb.	.30 –	.35
Toluene, tank cars	gal.	.30 –	.32
Toluene, drums	gal.	.34 –	.36
Xylidine, drums	lb.	.50 –	....
Xylene, pure, drums	gal.	.60 –	.65
Xylene, com., drums	gal.	.32 –	.34
Xylene, com., tanks	gal.	.28 –	.30

Naval Stores

Rosin B-D, bbl. 280 lb.		$5.75 –	$5.80
Rosin E-I, bbl. 280 lb.		5.85 –	....
Rosin K-N, bbl. 280 lb.		5.85 –	6.00
Rosin W.G.-W.W., bbl. 280 lb.		6.50 –	7.25
Wood rosin, bbl. 280 lb.		5.90 –	6.00
Turpentine, spirits of, bbl.	gal.	.99 –	....
Wood, steam dist., bbl.	gal.	.78 –	....
Wood, dest. dist., bbl.	gal.	.65 –	....
Pine tar pitch, bbl. 200 lb.		5.50 –	.....
Tar, kiln burned, bbl. 500 lb.		11.00 –	.....
Retort tar, bbl. 500 lb.		11.00 –	.....
Rosin oil, first run, bbl.	gal.	.42 –	.....
Rosin oil, second run, bbl.	gal.	.48 –	.....
Rosin oil, third run, bbl.	gal.	.52 –	.....
Pine oil, steam dist.	gal.	.70 –	.....
Pine oil, pure, dest. dist.	gal.	.65 –	.....
Pine tar oil, ref.	gal.	.48 –	.....
Pine tar oil, crude, tanks f.o.b. Jacksonville, Fla.	gal.	.32 –	.32½
Pine tar oil, double ref., bbl.	gal.	..... –	.75
Pine tar, ref., thin, bbl.	gal.	..... –	.25
Pinewood creosote, ref., bbl.	gal.	..... –	.52

Animal Oils and Fats

Degras, bbl.	lb.	$0.04½ –	$0.04½
Grease yellow, bbl.	lb.	.07½ –	.07½
Lard oil, Extra No. 1, bbl.	gal.	.86 –	.88
Neatsfootoil 20 deg. bbl.	gal.	1.20 –	1.25
No. 1, bbl.	gal.	.92 –	.94
Oleo Stearine		.12½ –	.....
Oleo oil, No. 1, bbl.	lb.	.12½ –	.13
Red oil, distilled, d.p. bbl.	lb.	.09½ –	.10
Saponified, bbl.	lb.	.09½ –	.10
Tallow, extra, loose	lb.	.08½ –	.....
Tall-w oil, acidless, bbl.	gal.	.88 –	.90

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	$0.13 –	.....
Castor oil, No. 1, bbl.	lb.	.13½ –	.....
Chinawood oil, bbl.	lb.	.21 –	.22
Coconut oil, Ceylon, bbl.	lb.	.09½ –	.10
Ceylon, tanks, N.Y.	lb.	.08½ –	.....
Coconut oil, Cochin, bbl.	lb.	.10½ –	.....
Corn oil, crude, bbl.	lb.	.10½ –	.....
Crude, tanks, (f.o.b. mill)	lb.	.09½ –	.10
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.10 –	.10½
Summer yellow, bbl.	lb.	.11½ –	.12
Winter yellow, bbl.	lb.	.12½ –	.13
Linseed oil, raw, car lots, bbl.	gal.	.88 –	.....
Raw, tank cars (dom.)	gal.	.83 –	.....
Boiled, cars, bbl. (dom.)	gal.	.90 –	.....
Olive oil, denatured, bbl.	gal.	1.10 –	1.12
Sulphur, (foots) bbl.	lb.	.08½ –	.08½
Palm, Lagos, casks	lb.	.07½ –	.07½
Niger, casks	lb.	.07½ –	.....
Palm kernel, bbl.	lb.	.08½ –	.....
Peanut oil, crude, tanks (mill)	lb.	.13 –	.....
Peanut oil, refined, bbl.	lb.	.13½ –	.14
Perilla, bbl	lb.	.14½ –	.15½
Rapeseed oil, refined, bbl.	gal.	.76 –	.....
Rapeseed oil, blown, bbl.	gal.	.82 –	.....
Sesame, bbl.	lb.	.11½ –	.11½
Soya bean (Manchurian), bbl.	lb.	.10½ –	.....
Tank, f.o.b. Pacific coast	lb.	.09 –	.....
Tank, (f.o.b. N.Y.)	lb.	.09½ –	.....

Fish Oils

Cod, Newfoundland, bbl.	gal.	$0.60 –	$0.62
Menhaden, light pressed, bbl.	gal.	.60 –	.....
White bleached, bbl.	gal.	.62 –	.....
Blown, bbl.	gal.	.67 –	.....
Crude, tanks (f.o.b. factory)	gal.	.42½ –	.....
Whale No. 1 crude, tanks, coast	lb.	..... –	.....
Winter, natural, bbl.	gal.	.76 –	.78
Winter, bleached, bbl.	gal.	.79 –	.80

Oil Cake and Meal

Coconut cake, bags	ton	$30.00 –	$31.00
Copra, sun dried, bags, (c.i.f.)	lb.	.05½ –	....
Sun dried Pacific coast	lb.	.05 –	....
Cottonseed meal, f.o.b. mills	ton	39.00 –	.....
Linseed cake, bags	ton	35.00 –	37.00
Linseed meal, bags	ton	42.00 –	43.00

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	$0.45 –	$0.50
Albumen, egg, tech, kegs	lb.	.95 –	1.00
Cochneal, bags	lb.	.32 –	.34
Cutch, Borneo, bales	lb.	.04 –	.04½
Cutch, Rangoon, bales	lb.	.15 –	.16
Dextrine, corn, bags 100 lb.		3.69 –	3.86
Dextrine, gum, bags 100 lb.		3.99 –	4.26
Divi-divi, bags	ton	38.00 –	39.00
Fustic, sticks	ton	30.00 –	35.00
Fustic, chips, bags	lb.	.04 –	.05
Logwood, sticks	ton	25.00 –	26.00
Logwood, chips, bags	lb.	.02½ –	.03
Sumac, leaves, Sicily, bags	ton	80.00 –	85.00
Sumac, ground, bags	ton	$75.00 –	$80.00
Sumac, domestic, bags	ton	40.00 –	42.00
Starch, corn, bags 100 lb.		3.12 –	3.39
Tapioca flour, bags	lb.	.07 –	.07½

Extracts

Archil, conc., bbl.	lb.	$0.18 –	$0.22
Chestnut, 25% tannin, tanks	lb.	.02 –	.03
Divi-divi, 25% tannin, bbl.	lb.	.04 –	.05
Fustic, crystals, bbl.	lb.	.20 –	.22
Fustic, liquid, 42°, bbl.	lb.	.08 –	.09
Gambier, liq., 25% tannin, bbl.	lb.	.08½ –	.09½
Hematine crys., bbl.	lb.	.14 –	.18
Hemlock, 25% tannin, bbl.	lb.	.03½ –	.04
Hypernic, solid, drums	lb.	.24 –	.26
Hypernic, liquid, 51°, bbl.	lb.	.09½ –	.10½
Logwood, crys., bbl.	lb.	15 –	.16
Logwood, liq., 51°, bbl.	lb.	.08 –	.08½
Quebracho, solid, 65% tannin, bbl.	lb.	.04½ –	.05
Sumac, dom., 51°, bbl.	lb.	.06½ –	.07½

Dry Colors

Blacks–Carbongas, bags, f.o.b. works, spot	lb.	$0.14 –	$0.18
Lampblack, bbl.	lb.	.12 –	.40
Mineral, bulk	ton	35.00 –	45.00
Blues–Bronze, bbl.	lb.	.50 –	.55
Prussian, bbl.	lb.	.50 –	.55
Ultramarine, bbl.	lb.	.08 –	.35
Browns, Sienna, Ital., bbl.	lb.	.06 –	.14
Sienna, Domestic, bbl.	lb.	.03½ –	.04
Umber, Turkey, bbl.	lb.	.04 –	.04½
Greens–Chrome, C.P.Light, bbl.	lb.	.30 –	.32
Chrome, commercial, bbl.	lb.	.12 –	.12½
Paris, bulk	lb.	.28 –	.30
Reds, Carmine No. 40, tins	lb.	4.50 –	4.70
Oxide red, casks	lb.	.10 –	.14
Para toner, kegs	lb.	1.00 –	1.10
Vermilion, English, bbl.	lb.	1.20 –	1.25
Yellow, Chrome, C.P. bbls.	lb.	.18 –	.18½
Ocher, French, casks	lb.	.02½ –	.03

Waxes

Bayberry, bbl.	lb.	$0.27 –	$0.28
Beeswax, crude, bags	lb.	.21 –	.26
Beeswax, refined, light, bags	lb.	.32 –	.34
Beeswax, pure white, cases	lb.	.40 –	.41
Candellila, bags	lb.	.22½ –	.23½
Carnauba, No. 1, bags	lb.	.42 –	.42½
No. 2, North Country, bags	lb.	.23 –	.23½
No. 3, North Country, bags	lb.	.17½ –	.17½
Japan, cases	lb.	.17½ –	.18½
Montan, crude, bags	lb.	.05 –	...
Paraffine, crude, match, 105-110 m.p., bbl.	lb.	.04½ –	.04½
Crude, scale 124-126 m.p. bags	lb.	.02½ –	.03
Ref., 118-120 m.p., bags	lb.	.03½ –	....
Ref., 125 m.p., bags	lb.	.03½ –	....
Ref, 128-130 m.p., bags	lb.	.03½ –	....
Ref., 133-135 m.p., bags	lb.	.04½ –	.04½
Ref., 135-137 m.p., bags	lb.	.05½ –	.05½
Stearic acid, agle pressed, bags	lb.	.12½ –	.12½
Double pressed, bags	lb.	.13 –	.13½
Triple pressed, bags	lb.	.14½ –	.14½

Fertilizers

Ammonium sulphate, bulk, f.o.b. works 100 lb.		$3.20 –	$3.25
F.a.s. double bags 100 lb.		3.40 –	3.50
Blood, dried, bulk	unit	4.00 –	.....
Bone, raw, 3 and 50, ground	ton	26.00 –	28.00
Fish scrap, dom., dried, wks.	unit	..... –	.....
Nitrate of soda, bags 100 lb.		2.40 –	2.52½
Tankage, high grade, f.o.b. Chicago	unit	3.25 –	3.35
Phosphate rock, f.o.b. mines, Florida pebble, 68-72%	ton	4.00 –	4.50
Tennessee, 78-80%	ton	7.75 –	8.00
Potassium muriate, 80%, bags	ton	34.55 –	.....
Potassium sulphate, bags basis 90%	ton	43.67 –	.....
Double manure salt	ton	25.72 –	.....
Kainit	ton	7.22 –	.....

Crude Rubber

Para—Upriver fine	lb.	$0.28½ –	.....
Upriver coarse	lb.	.23 –	.....
Upriver caucho ball	lb.	.24 –	.....
Plantation—First latex crepe	lb.	.29½ –	.....
Ribbed smoked sheets	lb.	.29½ –	.....
Brown crepe, thin, clean	lb.	.28½ –	.....
Amber crepe No. 1	lb.	.28½ –	.....

Gums

Copal, Congo, amber, bags	lb.	$0.12 –	$0.16
East Indian, bold, bags	lb.	.23 –	.23½
Manila, pale, bags	lb.	.20 –	.20½
Pontinak, No. 1 bags	lb.	.20 –	.20½
Damar, Batavia, cases	lb.	.26½ –	.27
Singapore, No. 1, cases	lb.	.32 –	.33
Singapore, No. 2, cases	lb.	.23½ –	.24
Kauri, No. 1, cases	lb	.68 –	.70
Ordinary chips, cases	lb.	.21 –	.23
Manjak, Barbados, bags	lb.	.09 –	.09½

Shellac

Shellac, orange fine, bags	lb.	$0.64 –	$0.65
Orange superfine, bags	lb.	.66 –	.67
A. C. garnet, bags	lb.	.61 –	.62
Bleached, bonedry	lb.	.72 –	.73
Bleached, fresh	lb.	.61 –	.62
T. N., bags	lb.	.61 –	.62

Miscellaneous Materials

Asbestos, crude No. 1, f.o.b. Quebec	sh. ton	$375.00 –	$500.00
Asbestos, shingle, f.o.b., Quebec	sh. ton	$55.00 –	$60.00
Asbestos, cement, f.o.b., Quebec	sh. ton	20.00 –	25.00
Barytes, grd., white, f.o.b. mills, bbl.	net ton	16.00 –	20.00
Barytes, grd., off-color, f.o.b. mills bulk	net ton	13.00 –	15.00
Barytes, floated, f.o.b. St. Louis, bbl.	net ton	28.00 –	.....
Barytes, crude f.o.b. mines, bulk	net ton	8.00 –	10.00
Casein, bbl., tech.	lb.	.13½ –	.15½
China clay (kaolin) crude, f.o.b. Ga.	net ton	6.00 –	8.00
Washed, f.o.b. Ga.	net ton	8.00 –	9.00
Powd., f.o.b. Ga.	net ton	14.00 –	20.00
Crude f.o.b. Va.	net ton	5.00 –	8.00
Ground, f.o.b. Va.	net ton	13.00 –	19.00
Imp., lump, bulk	net ton	15.00 –	20.00
Imp., powd.	net ton	45.00 –	50.00
Feldspar, No. 1 pottery	long ton	7.50 –	.....
No. 2 pottery	long ton	6.00 –	.....
No. 1 soap	long ton	8.50 –	.....
No. 1 Canadian, f.o.b. mill	long ton	18.00 –	20.00
Graphite, Ceylon, lump, first quality, bbl.	lb.	.06 –	.06½
Ceylon, chip, bbl.	lb.	.04½ –	.05
High grade amorphous crude	ton	15.00 –	30.00
Gum arabic, amber, sorts, bags	lb.	.13½ –	.14
Gum tragacanth, sorts, bags	lb.	.50 –	.55
No. 1, bags	lb.	1.45 –	1.50
Kieselguhr, f.o.b. Cal.	ton	40.00 –	42.00
F.o.b. N.Y.	ton	50.00 –	55.00
Magnesite, crude, f.o.b. Cal.	ton	14.00 –	15.00
Pumice stone, imp., casks	lb.	.03 –	.05½
Dom., lump, bbl.	lb.	.05 –	.05½
Dom., ground, bbl.	lb.	.05½ –	.06
Silica, glass sand, f.o.b. Ind.	ton	2.00 –	2.50
Silica, sand blast, f.o.b. Ind.	ton	2.50	5.00
Silica, amorphous, 250-mesh, f.o.b. Ill.	ton	17.00 –	17.50
Silica, glass sand, f.o.b. Ill.	ton	1.50 –	3.00
Soapstone, coarse, f.o.b. Vt., bags	ton	7.00 –	8.00
Talc, 200 mesh, f.o.b., Vt., bags, extra	ton	6.00 –	8.00
Talc, 200 mesh, f.o.b. Ga., bags	ton	7.00 –	9.00
Talc, 200 mesh, f.o.b. Los Angeles, bags	ton	18.00 –	20.00

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$2.75 –	.....
Corning	bbl.	1.60 –	.....
Cabell	bbl.	1.50 –	.....
Somerset	bbl.	1.40 –	.....
Illinois	bbl.	1.67 –	.....
Indiana	bbl.	1.68 –	.....
Kansas and Oklahoma, 28 deg.	bbl.	.85 –	.....
California, 35 deg. and up	bbl.	1.04 –	.....

Gasoline, Etc.

Motor gasoline, steel bbls.	gal.	$0.19½ –	.....
Naphtha, V. M. & P. deod, steel bbls.	gal	.18½ –	.....
Kerosene, ref. tank wagon	gal.	.14 –	.....
Bulk, W.W. delivered, N.Y.	gal.	.06 –	.....
Lubricating oils:			
Cylinder, Penn., dark	gal.	.21½ –	.....
Bloomless, 30@31 grav.	gal.	.17½ –	.....
Paraffin, pale	gal.	.15 –	.17
Spindle, 200, pale	gal.	.20½ –	.21
Petrolatum, amber, bbls.	lb.	.03½ –	.04
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,000	$140–	145
Chrome brick, f.o.b. Eastern shipping points	ton	50–	52
Chrome cement, 40-50% Cr_2O_3	ton	23–	27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00	
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	45–	48
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	38–	42
Magnesite brick, 9-in. straight (f.o.b. wks.)	ton	65–	68
9-in. arches, wedges and keys	ton	80–	85
Scraps and splits	ton		85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	53–	55
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	53–	54
F.o.b. Mt. Union, Pa.	1,000	45–	47
Silicon carbide refract. brick, 9-in.	1,000	1,100.00	

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N.Y.	ton	$200.00 –	$225.00
Ferrochromium, per lb. of Cr, 1-2% C	lb.	.28 –	.30
4-6% C	lb.	.12 –	...
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	117.50 –	.....
Spiegeleisen, 19-21% Mn.	gr. ton	45.00 –	47.00
Ferromolybdenum, 50-60% Mo, per lb Mo	lb.	2.00 –	2.50
Ferrosilicon, 10-12%	gr. ton	43.00 –	50.00
50%	gr. ton	85.00 –	.....

Ferrotungsten, 70–80%, per lb. of W	lb.	$0.85 @ $0.95
Ferro-uranium, 35-50% of U. per lb. of U	lb.	4.50 – ....
Ferrovanadium, 30-40%, per lb. of V	lb.	3.50 – 4.50

Ores and Semi-finished Products

Bauxite, dom. crushed dried, f.o.b. shipping points	ton	$5.50 – $8.75
Chrome ore, Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 – 23.00
C.i.f. Atlantic seaboard	ton	21.00 – 25.00
Coke, fdry., f.o.b. ovens	ton	6.00 – 6.50
Coke, furnace, f.o.b. ovens	ton	5.00 – 5.25
Fluorspar, gravel, f.o.b. mines' Illinois	ton	23.50 – .....
Ilmenite, 52% TiO_2	lb.	.01½– .01¾
Manganese ore, 50% Mn c.i.f. Atlantic seaport	unit	.40 – .....
Manganese ore, chemical (MnO_2)	ton	75.00 – 80.00
Molybdenite, 85% MoS_2, per lb. MoS_2, N. Y.	lb.	.75 – .....
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 – .08
Pyrites, Span., fines, c.i.f. Atl. seaport	unit	.11½– .12
Pyrites, Span., furnace size, c.i.f. Atl. seaport	unit	.11½– .12
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12 – .....
Rutile, 95% TiO_2	lb.	.12 – .....
Tungsten, scheelite, 60% WO_3 and over	unit	9.50 – 10.00
Tungsten, wolframite, 60% WO_3	unit	8.75 – 9.00
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 – 3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	2.25 – 2.50
Vanadium pentoxide, 99%	lb.	12.00 – 14.00
Vanadium ore, per lb. V_2O_5	lb.	.75 – 1.00
Zircon	ton	50.00 – .....

Non-Ferrous Materials

	Cents per Lb.
Copper, electrolytic	13¾
Aluminum, 98 to 99%	26–27
Antimony, wholesale, Chinese and Japanese	7¼– 7¾
Nickel, virgin metal	27–29
Nickel, ingot and shot	30–32
Monel metal, shot and blocks	32.00
Monel metal, ingots	38.00
Monel metal, sheet bars	45.00
Tin, 5-ton lots, Straits	42.12½
Lead, New York, spot	6.85
Lead, E. St. Louis, spot	6.75
Zinc, spot, New York	6.85
Zinc, spot, E. St. Louis	6.50

Other Metals

Silver (commercial)	oz.	$0.63¾
Cadmium	lb.	1.00
Bismuth (500 lb. lots)	lb.	2.55
Cobalt	lb.	3.00-3.25
Magnesium, ingots, 99%	lb.	1.25– .....
Platinum	oz.	116.00
Iridium	oz.	275.00@300.00
Palladium	oz.	80.00
Mercury	75 lb.	62.00–64.00

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled	20.25
Copper bottoms	30.75
Copper rods	20.75
High brass wire	19.00
High brass rods	16.75
Low brass wire	20.75
Low brass rods	21.00
Brazed brass tubing	24.00
Brazed bronze tubing	27.00
Seamless copper tubing	25.50
Seamless high brass tubing	24.00

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

Copper, heavy and crucible	9.00@ 9.25
Copper, heavy and wire	11.25@11.50
Copper, light and bottoms	10.25@10.50
Lead, heavy	5.50@ 5.62½
Lead, tea	3.50@ 3.75
Brass, heavy	6.25@ 6.50
Brass, light	5.25@ 5.50
No. 1 yellow brass turnings	6.00@ 6.25
Zinc scrap	3.75@ 4.00

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	$3.54	$3.54
Soft steel bars	3.54	3.54
Soft steel bar shapes	3.54	3.54
Sft st eel bands	4.39	4.39
Plates, ¼ to 1 in. thick	3.64	3.64

Industrial

Financial, Construction and Manufacturing News

Construction and Operation

Alabama

MOBILE—The Mobile Varnish Works, Inc., will commence production at its new local plant now practically completed on a basis of 60,000 gal. per day. It is purposed to install additional equipment to advance this output to 100,000 gal. daily by the close of the year.

Arkansas

EL DORADO—The Middle States Oil Co., 383 Madison Ave., New York, has acquired the plant and property of the Maar Oil Co., and will operate in conjunction with its other affiliated interests in this district. Plans are under consideration for extensions and improvements.

California

BERKELEY—George A. Moore & Co., 212 California St., San Francisco, producers of copra, kapok and kindred products, have completed plans and will soon commence the erection of a new flotation plant at 615 University Ave., estimated to cost $27,000.

OAKLAND—Fire, Aug. 29, destroyed a portion of the plant of the Pacific Enamel & Mfg. Co., with loss estimated at $23,000, including equipment. It is planned to rebuild.

PERRIS—The Perris Mining Co. is planning for the extensive development of feldspar and silica properties in this section. Plans are under consideration for the installation of equipment, including the construction of a reduction works for commercial material, at a later date.

SAN FRANCISCO—The Pacific Coast Steel Co. has tentative plans under advisement for the construction of a new steel works and blast furnace, to be located either at South San Francisco or on site to be secured at Long Beach, near Los Angeles. Other expansion plans, including the purchase and extension of existing smaller properties, are under consideration, calling for a gross expenditure of $15,000,000. The company will be affiliated with the Pacific Steel Corp., recently formed under Delaware laws with a capital of $40,000,000. Headquarters are in the Rialto Bldg.

SAN FRANCISCO—The Glidden Co. of California, 1300 7th St., manufacturer of paints, varnishes, etc., is making improvements at its plant to cost about $17,000.

RIVERSIDE—The Riverside Products Co. is planning for the construction of a new local plant for the manufacture of cement and concrete tile products, with initial equipment to provide for an output of approximately 8,000 tiles daily.

Florida

SARASOTA—The Burns Construction Co. has preliminary plans for the construction of a new local plant for the manufacture of cement tile products, including blocks and other shapes, estimated to cost about $25,000. A list of equipment to be installed will soon be arranged. T. R. Martin, Sarasota, is architect. Owen Burns is president.

Illinois

ROCKFORD—The George D. Roper Corp., South Main St., will rebuild the portion of its japanning department recently destroyed by fire with loss estimated at $25,000, including equipment.

CHICAGO—The Huch Leather Co., 1920 Mendell St., has filed plans for the erection of a 1-story addition, 25x110 ft., for which a general contract has been let to A. C. Thielberg, 64 West Randolph St.

RIVERDALE—The Acme Steel Goods Co. is completing the erection of a new addition to be used for a cold rolled steel strip mill, and plans to place the unit in service at an early date. It will represent an investment of about $1,000,000, including equipment, and will increase the capacity of the works about one-third.

Maryland

BALTIMORE—Officials of the Davison Chemical Co., Garrett Bldg., and its affiliated organization, the Silica Gel Corp., have formed a new subsidiary under the name of the Silica Gel Products Corp., to operate a local plant for the manufacture of powders and other products under the silica gel process. Plans for operation will be perfected at an early date. Silica gel will be furnished exclusively by the parent organization for production. Wilbur Miller is president.

BALTIMORE—The Prudential Oil Co., Fairfield, will build a new storage and distributing plant at 4th Ave. and 7th St., estimated to cost $100,000, with equipment.

Massachusetts

HOLYOKE—The Judd Paper Co., 166 Race St., has foundations in progress for the erection of a new 3-story and basement building at its plant, to be 90x100 ft., estimated to cost $75,000. The Casper Ranger Construction Co., Holyoke, is general contractor. George P. B. Alderman & Co., 316 High St., are architects.

BOSTON—The New England Fibre Mills have leased space in the building at 562-70 Atlantic Ave., for a local works.

WATERTOWN—The Hood Rubber Co., Nichols Ave., manufacturer of automobile tires and other rubber products, is taking bids on a general contract for the construction of a new addition for general increase in capacity, estimated to cost $35,000. F. E. Hood is general manager.

BOSTON—The Tileston & Hollingsworth Co., 49 Federal St., manufacturer of paper and cardboard products, has foundation work in progress for the erection of a 2-story addition to its plant in the Hyde Park section, 40x100 ft., estimated to cost about $100,000. George F. Hardy, 309 Broadway, New York, is architect.

Michigan

LANSING—The Owosso Sugar Co., Owosso, Mich., is planning for the reopening of its local branch mill and will make improvements and repairs to equipment at once. The mill is devoted to beet sugar production and expects to maintain close to capacity operations for at least 3 months.

CALUMET—The Arcadian Consolidated Mining Co. is planning for the installation of equipment for a new surface plant at its New Baltic properties, replacing a works destroyed by fire last spring. The work will include hoisting apparatus, air compressors, boilers, etc.

HOLLY—The National Steel Products Co., 2270 Franklin St., Detroit, has acquired the local plant of the Ground Hog Tractor Co., defunct, for the establishment of a new branch works. The structure will be improved and machinery installed at once.

Missouri

SELIGMAN—The Silver Lake Mining Co. has tentative plans in preparation for the erection of a new plant for the extraction of minerals from clay, with subsidiary works for refining, cleaning, etc. The company has a local tract of more than 1,000 acres of land, and has recently installed a reduction plant for securing gold and silver from rock. Roy Milton, Webb City, Mo., is one of the heads of the company, in charge.

ST. LOUIS—The American Aluminum Co., 305-7 South 7th St., has tentative plans under advisement for the rebuilding of the portion of its plant recently destroyed by fire with loss approximating $140,000.

New Jersey

SOUTH GLASSBORO—The Owens Bottle Co., Toledo, O., is perfecting facilities for maximum manufacture at its local plant, concentrating exclusively on glass bottles and containers. Practically all molding work will be handled at the Western plant of the company.

New York

NORTH TONAWANDA—The Ontario Paper Co., Thorold, Ont., is having plans prepared for the erection of a new paper mill and power house on site selected at Little Island, estimated to cost in excess of $2,500,000, with equipment. The company is also negotiating for the purchase of pulp properties in Quebec and purposes to install a mill in this section at a later date. Warren Curtis is general manager.

LONG ISLAND CITY—Carters Coaters, Inc., 51 York St., Brooklyn, manufacturer of paints, roofing compounds, etc., has leased, with option to purchase, property on Hopkins Ave., near Ridge St., comprising about 65 lots, with 1- and 2-story buildings, totaling 60,000 sq.ft., for a local plant.

TOTTENVILLE, S. I.—The Atlantic Industrial Alcohol Co., 300 Madison Ave., New York, is completing plans and will soon take bids for the erection of its proposed new plant on the Arthur Kill Road, consisting of three main buildings to be equipped for an initial output of 100 bbl. per day. J. E. Egert, care of Floyd S. Corbin, 300 Madison Ave., is engineer in charge.

GOULD—Fire, Aug. 31, destroyed a portion of the plant of the Hoboken Paper Co., Gould, near Stottville, with loss estimated in excess of $300,000, including equipment. Main offices of the company are at 51 Newark Ave., Hoboken, N. J.

NORWOOD—The Martin Pulp & Paper Co. has commenced the erection of a new plant to be devoted to the manufacture of tissue papers. It is estimated to cost in excess of $150,000, with equipment.

North Carolina

SYLVIA—The Carolina Pole Co. will build a new creosoting plant for the treatment of wood poles on the Cullowhee Road, with initial capacity of about 75,000 poles per day. It will cost approximately $65,000. J. L. Dilliard is secretary and treasurer.

Ohio

CLEVELAND—The Ohio Chemical & Mfg. Co., 1177 Marquette Road, has acquired the Lennox Chemical Co., with local plant at 1205 East 55th St. Operations will be continued and the business merged with that of the purchasing company. Expansion plans are under consideration. Both companies specialize in the manufacture of oxygen, carbonic acid gas and kindred products.

ASHTABULA—The Ashtabula Sheet Steel Co., recently organized, has acquired the local plant of the Ashtabula Steel Co., and will take immediate possession. The works will be improved and operated for the production of sheet steel products. The new company is headed by W. H., A. I. and Samuel Davey, all of Mansfield, Ohio.

AKRON—Consolidation plans have been perfected by the Mohawk Rubber Co. and the Star Rubber Co., both with local plants, under the name of the first-noted company. The new organization will be capitalized at $3,000,000, and plans for extensive operations; the plants will be developed to an output estimated at $5,000,000 a year.

Pennsylvania

PHILADELPHIA—The Pennsylvania Sugar Co., Delaware Ave., has awarded a general contract to the O'Meara Construction Co., 228 Warnock St., for the erection of an addition to its refining plant at 1015-21 Penn St., estimated to cost about $300,000.

FLEETWOOD—The Reading Rubber Co., Carsonia Ave., Reading, has preliminary plans for the erection of a 1-story addition to its plant at Fleetwood, 100x100 ft., with improvements in the present building, estimated to cost $75,000. Samuel H. Bell is president.

PHILADELPHIA—The Walter L. Trainer Co., 3328 Germantown Ave., manufacturer of varnishes, has filed plans for the erection of a 1-story addition.

MCKEESPORT—The Watson Paint & Glass Co., 101 Wood St., Pittsburgh, has preliminary plans in preparation for the erection of a 2-story addition to its plant at McKeesport, 25x150 ft. Courtney L. Whitaker, Dravosburg, Pa., is architect.

Rhode Island

PROVIDENCE—The Davol Rubber Co., Point and Eddy Sts., is taking bids on a general contract for the erection of a proposed 3-story addition to its plant, estimated to cost $75,000. F. P. Sheldon & Sons, Hospital Trust Bldg., are architects.

South Carolina

ANDERSON—The local plant of the Farmers' Oil Mill Co., manufacturer of cottonseed oil products, has been acquired by E. A. Gilfillin, Greenville, S. C., and associates. The new owners plan for the organization of a company to operate and expand the plant.

Tennessee

CHATTANOOGA—The Crane Enamelware Co. will install fifteen electric furnaces and auxiliary equipment in its new plant addition now in course of erection, to be devoted for the most part to the manufacture of small sanitary ware products and designed to double the capacity of the plant in this department. It will cost approximately $250,000, with machinery, and is expected to be ready for service early in the coming year. The company is operated by the Crane Co., 836 South Michigan Ave., Chicago, Ill.

NASHVILLE—The property of the Nashville Pulp & Paper Mills, Inc., has been purchased by L. I. Cooke and associates, including a partly completed mill at Hadley's Bend. The new owners plan to resume construction on the plant and will install machinery for operation at the earliest date. It is purposed to develop maximum output.

Texas

LULING—The Magnolia Petroleum Co., Dallas, has perfected plans for the construction of a new local refining plant, to be equipped for an initial output of about 6,000 bbl. of oil per day.

LUBBOCK—The Lubbock Cotton Oil Co. is rushing construction on its new local mill and purposes to have the plant ready for the machinery installation at an early date. It will be of 110-ton capacity and is estimated to cost approximately $275,000.

Washington

PORT ANGELES—The Washington Pulp & Paper Co. has awarded a general contract to Anderson & Son, Inc., Port Angeles, for the erection of a new 2-story building, 68x210 ft., to be equipped as an acid works.

New Companies

CHARTER OAK MAGNESIA MFG. CO., INC., Hartford, Conn.; chemicals, magnesia, etc.; $50,000. Incorporators: M. S. Lewis, Max Zietz, and Truman D. Cowles, 30 South Quaker Lane, Hartford.

INDUSTRIAL PROCESSING FACTORIES, INC., 4703 Forrestville Ave., Chicago, Ill.; chemicals, soaps, lubricants, etc.; $10,000. Representative: Howe, Fordham & Kreamer, 7 South Dearborn St., Chicago.

PARKERSBURG CLAY PRODUCTS CORP., Parkersburg, W. Va.; tile and ceramic products; $250,000. Incorporators: B. F. Miller, G. A. Dudley and George C. Mead, all of Parkersburg.

BEAUCHAMP OIL CO., INC., San Antonio, Tex.; petroleum products; $150,000. Incorporators: C. A. Beauchamp, C. R. Hartsfield and H. H. Ogilvie, all of San Antonio.

PENNSYLVANIA ATLAS CHEMICAL CO., Dover, Del.; chemicals and chemical byproducts; $550,000. Representative: United States Corporation Co., Dover.

CALIFORNIA NAPHTHA PRODUCTS, INC., Vernon, Calif.; naphtha and other petroleum products; $50,000. Incorporators: John D. Scouller. William Crossley and Robert C. Colvin. Representative: Fogel & Beman, Merchants' National Bank Bldg., Los Angeles.

POLYCHROME CHEMICAL CO., INC., Newark, N. J.; chemicals and chemical byproducts; $100,000. Incorporators: Leonard J. Donhauser, Lawrence A. Muench and August Greiner. Representative: Ernest Scuorzo, 235 Oliver St., Newark.

F. F. DALLEY INTERNATIONAL CO., New York, N. Y.; polishes, etc.; $100,000. Representative: Corporation Trust Co. of America, du Pont Bldg., Wilmington, Del.

WEST CHEMICAL & PAINT CO., Springport, Mich.; paints, varnishes, shellacs, etc.; $100,000. Incorporators: Karl M. Sorrick, W. H. West and Rollo J. West, all of Springport.

SOUTHERN ARKANSAS OIL CO., Pine Bluff, Ark.; petroleum products; $1,000,000. Incorporators: Frank B. Tomlinson and Harvey Hogg, both of Pine Bluff.

PUBLICKER COMMERCIAL ALCOHOL CO., New York, N. Y.; industrial alcohol, etc.; $20,000. Incorporators: T. F. Garvey, P. Acker and R. Davis. Representative: A. M. Davis, 297 Broadway, New York.

GILLICK TIRE & RUBBER CO., Wilmington, Del.; tires and other rubber products; $500,000. Representative: Colonial Charter Co., Ford Bldg., Wilmington.

DETROIT RENDERING CO., 2500 Isabelle St., Detroit, Mich.; greases, soaps, fertilizers, etc.; $150,000. Incorporators: Frank and E. G. Kracht, and Henry J. Schulte, 1057 East Grand Blvd., Detroit.

META SILIC BRICK & TILE CO., Manakatin, N. Y.; silica brick, tile, etc.; $1,000,000. Incorporators: M. Friedberg, S. Anhalt and L. W. Stern. Representative: J. D. Shifrin, 132 West 43d St., New York.

STEARNS-MCKAY MFG. CO., Marblehead, Mass.; paints, varnishes, etc.; $50,000. Alexander G. Grant is president; and George T. McKay, Marblehead, treasurer.

SUNRAY PRODUCTS CORP., Room 1703, 77 West Washington St., Chicago, Ill.; denatured alcohol and kindred products; $100,000. Incorporators: Herman N. Morton, and Harry Goldberg.

ORANGE DOME PETROLEUM CORP., Long Beach, Calif.; refined petroleum products; $100,000. Incorporators: Robert H. Jackson, Orange, Calif.; Edwin L. L. Wills and W. W. Rudloff, Long Beach. Representative: McCaughan & McCaughan, Marine Bank Bldg., Long Beach.

STANDARD AGRICULTURAL CHEMICAL CORP., Wilmington, Del.; chemicals, fertilizers, etc.; $75,000,000. Representative: Corporation Trust Co. of America, du Pont Bldg., Wilmington.

NATIONAL PETROLEUM CO., INC., Dallas, Tex.; petroleum products; $100,000. Incorporators: J. T. Wathers, Jr., S. Walker and G. C. McGhee, all of Dallas.

SALAS CHEMICAL CO., Philadelphia, Pa.; chemicals and chemical byproducts; $150,000. Incorporators: Ralph and Louis Rosenfelt, and Gustave Kohn. Representative: United States Corporation Co., Pennsylvania Bldg., Philadelphia.

Industrial Notes

The Dorr Co. has moved its Scranton office to 536 Miners' Bank Bldg., Wilkes-Barre, Pa. John Griffen will still be in charge of this branch.

The General Briquetting Co., New York City, announces the appointment of Thomas F. Kelly of Buffalo, N. Y., as manager of the Smelters' General Briquette Corporation, specializing in the manufacture of briquets for smelting purposes, notably from iron flue dust. The new corporation has been organized to succeed the metallurgical department of the General Briquetting Co. Ellsworth B. A. Zwoyer of Perth Amboy, N. J., has been appointed manager of the General Fuel Briquette Corporation, organized to succeed the fuel department of the General Briquetting Co.

The Universal Portland Cement Co., Chicago, Ill., has appointed J. H. Kempster general superintendent of its Buffington plant, located at Buffington, Ind., succeeding the late C. O. Soderquist. In 1907 Mr. Kempster joined the company 2 years after graduating as chemical engineer from the University of Michigan.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

EMBALMING FLUIDS and outfits. Oscarshamn, Sweden. Purchase and agency—7682.

FERTILIZERS. Porto Alegre, Brazil. Agency—7683.

GALLSTONES, natural. Shanghai, China. Agency—7661.

INDUSTRIAL CHEMICALS. Porto Alegre, Brazil. Agency—7683.

LAMPBLACK. Turin, Italy. Agency—7683.

PAINTS, dry and mixed. Porto Alegre, Brazil. Agency—7683.

SULPHATE OF AMMONIA and nitrate of soda. Murcia, Spain. Purchase—7680.

LAUNDRY SOAP, yellow, in long bars. Havana, Cuba. Agency—7674.